The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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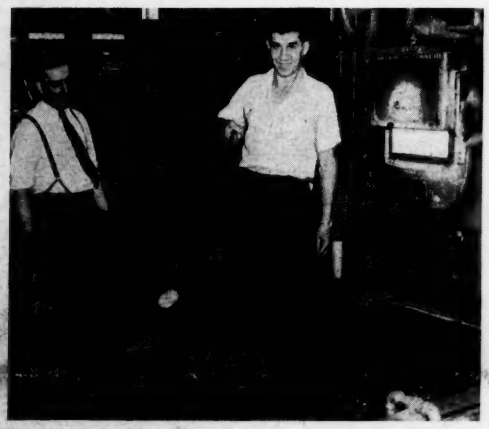
Hartford Trade School Expands Curriculum In Heat Treating

Reported by W. P. Eddy, Jr.
Materials Engineer, Pratt & Whitney Aircraft Div.

Contributing to the education and advancement of men working in the metals industry, the Hartford Chapter of the American Society for Metals has collaborated with the Hartford Trade School in the presentation of evening courses in metallurgy and heat treating during the 1944-45 winter season.

In 1943, the War Products Advisory Committee of the Hartford Chapter was instrumental in assisting the Hartford Trade School to select, purchase, and install a department of modern heat treating and testing equipment. Instructors, recruited from the membership of the Hartford Chapter, then organized and presented some elementary courses in metallurgical inspection, and the theory and practice of heat treating.



Instructor J. A. Swift looks on as a student prepares to quench a high speed steel part.

During the 1944-45 season, the 60-hour elementary courses were repeated and the curriculum expanded to include advanced courses of 30 hours each on "Constructional Steels" and "Tool Steels". ASM members participating in the program as instructors were John A. Swift,

(Continued on page 5)

Electro-Alloys Breaks Ground For $2,500,000 Construction Program

Ground has been broken for a $2,500,000 construction program for the Electro-Alloys Division of American Brake Shoe Co. at Elyria, Ohio. The project includes a completely new alloy foundry, office building and employees' building.

The new foundry will be more than four times the size of the present one, according to Walter G. Hoffman, president of Electro-Alloys Division, and will also take care of production of alloy formerly handled by American Manganese Steel Division of Chicago Heights, Ill. Equipment is to include three induction and three electric arc melting furnaces, sand conditioning and sand handling equipment, 15 molding machines, mold and core ovens, sandslinger, heat treating furnaces, and an installation of centrifugal casting machines. New X-ray equipment will be added to that already installed. Sand testing, chemical and physical laboratories will be located in the foundry.

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.

Name	Item No.

LAST MONTH IN THE METAL INDUSTRY

Required Reading

CAM-CUT SHIP PLATE permits tolerances of ± 0.003 in. with consequent higher quality welds and twice the production rate of the slower, traditional method of using templates to guide flame planer. See Section 22 on Joining, Item 22-491.

SUPERSONIC EQUIPMENT for flaw detection is a war development heretofore veiled by military secrecy. Both the American and the British instruments are now described in detail in Section 11 on Laboratory Apparatus and Instruments, Items 11-72 and 11-73.

FORGING MACHINE is completely automatic and eliminates all manual handling; production is 250 finished forgings per hour. See Section 19 on Working, Item 19-258.

X-RAY MICROGRAPHY is applied to searching out microcavities in castings. Simplified procedure and technique described in Section 12 on Inspection and Standardization, Item 12-195.

TIN UNDERCOATS for painted steel effectively increase corrosion resistance. Best treatment is 0.00003 in. of tin electrodeposited from sodium stannate bath. See Section 6 on Corrosion, Item 6-118.

CUMULATIVE FATIGUE DAMAGE provides basis for simple and conservative analysis. Experimental verification on an aluminum alloy given in Section 9 on Testing, Item 9-111.

SILVER BEARINGS have greater resistance to fatigue than any other known metal, when the silver is properly prepared and bonded to the bearing backing. See Section 21 on Friction and Lubrication, Item 21-74.

Notable Lectures

FROZEN MERCURY as a disposable pattern in a new type of mold material is used for precision casting of jet and turbo engine parts, according to G.A.'s president, Harry Harris. See page 4.

A NATIONAL SCIENCE FOUNDATION is advocated by Dean MacQuigg to pursue scientific research and development. See page 3.

VITALLIUM is a strong heat resistant alloy that meets the service requirements of aircraft engine turbo-supercharger buckets and can be precision cast. See report of Gray's talk on page 3.

SIGMA PHASE is a commonly overlooked factor in stainless steels which may account for some failures in service at high temperature, according to Francis Foley, page 4.

Products and Processes

CORROSION RESISTANT COATING for aluminum alloys is produced by simple immersion requiring no electric current, and gives salt spray resistance of 250 hr. See Manufacturers' Catalogs, Item 291.

INDUCTION HEATERS speed the heating of bars or tubes for forging, are mounted vertically, and placed right in the production line. See New Products, Item 271.

TWO NEW DIE CASTING MACHINES recently announced include a hydraulic machine with injection pressure of 25,000 psi. capable of producing aluminum castings weighing 30 lb. or more, and a machine that differs from the conventional gooseneck type in that it embodies a metal feeding device which sends a continuous stream of the molten alloy into a horizontal injection chamber; the air-operated ram develops 1410 psi. pressure. See Items 274 and 285.

HARD-FACED WEAR RESISTING PARTS which cannot be fabricated with oxy-acetylene equipment can now be satisfactorily handled by means of two new hard facing alloys developed for electric application. See Item 275.

National Metal Show And Metal Congress Slated for February

Plans have been completed for the first great postwar industrial show with the announcement of the 27th National Metal Exposition to be held in Cleveland's Public Auditorium from Monday, Feb. 4 through Friday, Feb. 8, 1946. The Metal Exposition was moved up from its usual October date in order to avoid any interference with heavy wartime transportation demands.

This industrial show will be the largest ever held in America, according to W. H. Eisenman, managing director of the Exposition and national secretary of the American Society for Metals, sponsor of the event. "The floor plans show a greater area of exhibit space than ever before allocated to this type of industrial show," he said. "For the first time in four years", Mr. Eisenman continued, "the Metal Show, as it is generally known in industry, will be a forthright effort on the part of exhibitors to sell their products."

Technical Societies Cooperate

The National Metal Congress will also be held in conjunction with the Exposition and will include daily technical sessions sponsored by the American Society for Metals, the Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers, the American Welding Society, and the American Industrial Radium and X-Ray Society. Many trade associations and industry groups will also meet in Cleveland during the week of this event.

An unusual feature of the technical program planned by the American Society for Metals will be a series of four educational courses consisting of five lectures each. Subjects of these five courses are: I. Magnesium; II. Induction Heating (Without Melting); III. Effect of Surface Stressing Metals on Endurance in Repeated Loadings; and IV. Corrosion of Metals.

The regular technical sessions will present the papers which were listed by title and author in the August issue of THE METALS REVIEW. These papers have already been preprinted and distributed to those ASM members who requested them.

Annual Meeting in November

The Annual Meeting of the American Society for Metals, at which new national officers are installed and annual reports presented, will not, however, be held during the convention in February. In order to conform with the constitution of the ASM, the Annual Meeting will be held on Nov. 2 at the Cleveland Club in conjunction with the November meeting of the Cleveland Chapter ASM. The annual banquet, however, will be held as usual on Thursday, Feb. 7, the fourth day of the Metal Congress. The annual medal awards of the Society will be presented at that time.

No housing bureau will be operated this year in conjunction with the National Metal Congress and Exposition. All members of the cooperating societies were notified on Oct. 1 to make reservations direct with the hotels of their choice.

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Addresses of Publications

Annotated in A.S.M. Review of Current Metal Literature

Save This List—Published Only Once a Year

Aero Digest, 515 Madison Ave., New York 22, N. Y.
Aeronautical Engineering Review, 1505 RCA Bldg., 30 Rockefeller Plaza, New York 20, N. Y.
Aircraft Engineering, 12 Bloomsbury Sq., London, W.C.1, England
Aircraft Production, Stamford St., London, S.E.1, England
Alloy Casting Bulletin, 39 Broadway, New York
Alloy Metals Review, Ditton Road, Widnes, Lancashire, England
Aluminium and Magnesium, 425 W. 25th St., New York 1, N. Y.
Aluminum and the Non-Ferrous Review, 25 High St., Merton, S.W.19, England
American Ceramic Society Journal, 2525 N. High St., Columbus, Ohio
American Electroplaters' Society Monthly Review (See Monthly Review)
American Foundryman, 222 West Adams St., Chicago 6, Ill.
American Foundrymen's Association Transactions, 222 West Adams St., Chicago 6, Ill.
American Iron and Steel Institute Yearbook, 350 5th Ave., New York 1, N. Y.
American Machinist, 330 W. 42nd St., New York 18, N. Y.
American Paint Journal, 3713 Washington Ave., St. Louis 8, Mo.
American Railway Engineers Association Bulletin, 59 E. Van Buren St., Chicago 5, Ill.
American Society for Metals Transactions, 7301 Euclid Ave., Cleveland 3, Ohio
American Society for Testing Materials Bulletin, 260 S. Broad St., Philadelphia 2, Pa.
American Society for Testing Materials Proceedings, 260 S. Broad St., Philadelphia 2, Pa.
American Society of Mechanical Engineers Journal, 29 W. 39th St., New York 18, N. Y.
American Society of Mechanical Engineers Transactions, 29 W. 39th St., New York 18, N. Y.
American Society of Naval Engineers Journal, Navy Bldg., Constitution Ave., 16th & 17th Sts. N.W., Washington, D. C.
American Welding Society, 33 W. 39th St., New York 18, N. Y.
Analyst, Hills Road, Cambridge, England
Architectural Forum, Time Inc., 350 5th Ave., New York 1, N. Y.
Architectural Record, 34 N. Crystal St., E. Stroudsburg, Pa.
Archiv fur Eisenhuttenwesen, Breite Str. 27, Dusseldorf, Germany
Army Ordnance, Suite 705, Mills Bldg., Washington 6, D. C.
Australasian Institute of Mining and Metallurgy Proceedings, 376-380 Collins St., Melbourne, Australia
Automobile Engineer, Dorset House, Stamford St., London, S.E.1, England
Automotive and Aviation Industries, Chestnut and 56th St., Philadelphia 39, Pa.
Aviation, 330 W. 42nd St., New York 18, N. Y.

Bell Laboratories Record, 463 West St., New York 14, N. Y.
Bell System Technical Journal, 195 Broadway, New York, N. Y.
Better Enameling, 1427 South 55th Court, Cicero 50, Ill.
Blast Furnace and Steel Plant, Thaw Bldg., Pittsburgh, Pa.
Brick and Clay Record, 59 E. Van Buren St., Chicago, Ill.
British Cast Iron Research Association Bulletin, Alvechurch, Birmingham, England
British Non-Ferrous Metals Research Association Bulletin, Euston St., London, N.W.1, England
British Steelmaker, 9 Adam St., Strand, London, England
Brown Boveri Review, 19 Rector St., New York, N. Y.
Business Week, 330 West 42nd St., New York 18, N. Y.

Canadian Chemistry and Process Industries, 137 Wellington St., Toronto 1, Ont., Canada
Canadian Metals and Metallurgical Industries, 137 Wellington St., Toronto 1, Ont., Canada
Canadian Mining and Metallurgical Bulletin, 906 Drummond Bldg., Montreal, Quebec, Canada
Ceramic Industry, 59 E. Van Buren St., Chicago, Ill.
Chemical Age, 154 Fleet St., London, E.C.4, England
Chemical and Engineering News, 20th & Northampton Streets, Easton, Pa.
Chemical and Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.
Chemical Industries, 522 Fifth Ave., New York 19, N. Y.
Chemist Analyst, Phillipsburg, N. J.
Compressed Air Magazine, 11 Broadway, New York 4, N. Y.
Corrosion and Material Protection, 1131 Wolfendale Street, Pittsburgh, Pa.
Crown, Box 1837, Baltimore 3, Md.

Die Casting, 812 Huron Rd., Cleveland 15, Ohio
Domestic Commerce, Superintendent of Documents, Government Printing Office, Washington 25, D. C.
Drop Forging Topics, 60 Hanna Bldg., Cleveland 15, Ohio

Edgar Allen News, Edgar Allen & Co., Ltd., Sheffield 9, England
Electric Light & Power, 360 North Michigan Ave., Chicago, Ill.
Electrical Engineering, 33 West 39th St., New York 18, N. Y.
Electrochemical Society Transactions, 3000 Broadway, New York 27, N. Y.
Electrodepositors' Technical Society Journal, St. John St., Clerkenwell, London, E.C.1, England
Electronic Engineering, 43 Shoe Lane, London, E.C.4, England
Electronic Industries, 480 Lexington Ave., New York 17, N. Y.
Electronics, 330 W. 42nd St., New York 18, N. Y.
Enamelist, 4150 East 56th St., Cleveland 5, Ohio
Engineer, 28 Essex St., Strand, London, W.C.2, England
Engineering, 35-36 Bedford St., Strand, London, W.C.2, England
Engineering and Mining Journal, 330 W. 42nd St., New York 18, N. Y.
Engineering Inspection, 2 Caxton St., Westminster, S.W.1, England
Engineers' Digest (American Edition), 1 Madison Ave., New York 10, N. Y.

Factory Management and Maintenance, 330 W. 42nd St., New York 18, N. Y.
Fasteners, 1550 Hanna Bldg., Cleveland 15, Ohio
Finish, 360 N. Michigan Ave., Chicago 1, Ill.
Fortune, 350 E. 22nd St., Chicago, Ill.
Foundry, Penton Bldg., Cleveland, Ohio
Foundry Trade Journal, 49 Wellington St., Strand, London, W.C.2, England (Wartime Address: 3 Amersham Rd., High Wycombe, Bucks, England)
Franklin Institute Journal, Franklin Institute, Philadelphia, Pa.

General Electric Review, Schenectady, New York 5, N. Y.
Giesserei, Dusseldorf, Germany

Heating and Ventilating, 148 Lafayette St., New York 13, N. Y.

Industrial Aviation, 185 North Wabash Ave., Chicago 1, Ill.
Industrial Chemist, 33 Tothill St., Westminster, London, S.W.1, England
Industrial and Engineering Chemistry, Easton, Pa.
Industrial Finishing, 1142 N. Meridian St., Indianapolis 4, Ind.
Industrial Gas, 56th & Chestnut St., Philadelphia 39, Pa.
Industrial Heating, Union Trust Bldg., Pittsburgh, Pa.
Industrial Marketing, 100 East Ohio St., Chicago, Ill.
Industrial Radiography, 25 East Washington St., Chicago, Ill.
Industry and Power, St. Joseph, Mich.
Industry and Welding, Industrial Publishing Co., 812 Huron Rd., Cleveland 15, Ohio
Institute of Metals Journal, 4 Grosvenor Gardens, London, S.W.1, England
Institute of Radio Engineers Proceedings, 330 W. 42nd St., New York 18, N. Y.
Institute of Welding Transactions, 2 Buckingham Palace Gardens, London, S.W.1, England
Institution of Automobile Engineers, 12 Hobart Place, London, S.W.1, England
Institution of Mechanical Engineers, Storey's Gate, St. James Park, London, S.W.1, England
Instruments, 1117 Wolfendale St., Pittsburgh 12, Pa.
Iron Age, 100 E. 42nd St., New York 17, N. Y.
Iron and Steel, Dorset House, Stamford St., London, S.E.1, England
Iron and Steel Engineer, Empire Bldg., Pittsburgh, Pa.
Iron and Steel Institute Bulletin, 4 Grosvenor Gardens, London, S.W.1, England
Iron and Steel Institute Journal, 4 Grosvenor Gardens, London, S.W.1, England

Jernkontorets Annaler, Stockholm 16, Sweden
Journal of Aeronautical Sciences, 30 Rockefeller Plaza, 1505 RCA Bldg., New York 20, N. Y.
Journal of Applied Mechanics, 20th & Northampton Sts., Easton, Pa.
Journal of Applied Physics, American Institute of Physics, 57 E. 55th Street, New York 22, N. Y.
Journal of Research, National Bureau of Standards, Government Printing Office, Washington, D. C.
Journal of Scientific Instruments, Fetter Lane, London, E.C.4, England (Temporary Address: Institute of Physics, The University, Berkshire, England)

Korrosion und Metallschutz, Berlin, Germany

Light Metal Age, 201 North Wells St., Chicago 6, Ill.
Light Metals, Bowling Green Lane, 5-17 Roseberry Ave., London, E.C.1, England
Lubrication, 135 E. 42nd Street, New York City
Luftfahrtforschung, Gluckstr. 8, Munich 32, Germany

Machine Design, Penton Bldg., Cleveland, Ohio
Machine Tool Blue Book, 542 S. Dearborn St., Chicago 5, Ill.
Machine Tools, Cleveland, Ohio
Machinery (London), 17 Marine Parade, Brighton, England
Machinery (N. Y.), 140 Lafayette Street, New York 13, N. Y.
Machinery Lloyd, 152 Upper New Walk, Leicester, England
Mechanical Engineering, 29 W. 39th St., New York 18, N. Y.
Metal Finishing, 330 W. 42nd St., New York 18, N. Y.
Metal Industry, Dorset House, Stamford St., London, S.E.1, England
Metal Progress, 7301 Euclid Avenue, Cleveland 3, Ohio
Metal Treatment, 49 Wellington St., Strand, London, W.C.2. England (Wartime Address: 3 Amersham Rd., High Wycombe, Bucks, England)
Metallurgia, 21 Albion St., Gaythorn, Manchester 1, England
Metals, 425 West 25th St., New York 1, N. Y.
Metals and Alloys, 330 W. 42nd St., New York 18, N. Y.
Metals Technology, 29 W. 39th Street, New York 18, N. Y.
Mine and Quarry Engineering, 23 Great Queen St., London, W.C.2, England
Mines Magazine, 734 Cooper Bldg., Denver 2, Colo.
Mining and Metallurgy, 29 W. 39th St., New York 18, N. Y.
Mining Congress Journal, 309 Munsey Bldg., Washington 4, D. C.
Mining Journal, 520-528 Title & Trust Bldg., Phoenix, Ariz.
Mining Technology, 29 W. 39th Street, New York 18, N. Y.
Mining World, 71 Columbia Street, Seattle 7, Wash.
Modern Industrial Press, Windsor Manor, P.O. Box 687, Pittsburgh 30, Pa.
Modern Industry, 347 Madison Ave., New York 17, N. Y.
Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio
Modern Metals, Burnham Bldg., Chicago 1, Ill.
Modern Plastics, 122 E. 42nd St., New York 17, N. Y.
Monthly Review, American Electroplaters' Society, 545 Fifth Avenue, New York 22, N. Y.

New Pencil Points, 330 W. 42nd St., New York 18, N. Y.
Nickel Bulletin, Grosvenor House, Park Lane, London, England

Optical Society of America Journal, American Institute of Physics, 57 E. 55th Street, New York 22, N. Y.
Organic Finishing, 11 West 42nd St., New York 18, N. Y.
Oxy-Acetylene Tips, 30 E. 42nd St., New York 17, N. Y.

Paint and Varnish Production Manager, Mills Bldg., Washington 6, D. C.
Paint Technology, 5 Grange Court, Pinner, Middlesex, England
Petroleum Refiner, Gulf Publishing Co., Box 2608, Houston, Texas
Pig Iron Rough Notes, Birmingham, Ala.
Plastics (American), 540 North Michigan Ave., Chicago 11, Ill.
Plastics, Bowling Green Lane, London, E.C.1, England
Printing Equipment, 1276 W. 3rd Street, Cleveland 13, Ohio
Product Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.
Production and Engineering Bulletin, British Information Service, 30 Rockefeller Plaza, New York, N. Y.
Production Engineering and Management, 2842 West Grand Blvd., Detroit 2, Mich.
Products Finishing, 431 Main St., Cincinnati 2, Ohio
Purchasing, 205 E. 42nd St., New York 17, N. Y.

Railway Age, 1309 Noble St., Philadelphia, Pa.
Railway Engineering and Maintenance, 105 W. Adams Street, Chicago 3, Ill.
Railway Mechanical Engineer, Terminal Tower, Cleveland 13, Ohio
Refractories Journal, 8 Adam St. Adelphi, The Strand, London, W.C.2, England
Reviews of Modern Physics, American Institute of Physics, 57 E. 55th Street, New York 22, N. Y.

Scientific American, 24 W. 40th St., New York 18, N. Y.
Schweizer Archiv, Solothurn, Switzerland

(Continued on page 17)

Plasticity of Metallic Crystals Accounts for Welding Action

Reported by Daniel J. Clini
Factory Manager, Heatbath Corp.

Three methods of welding metals—fusion, brazing and pressure—were covered by Prof. Carl G. Johnson of the engineering department of Worcester Polytechnic Institute in a paper on "Latest Developments in Welding Metallurgy" presented before a joint meeting of the Springfield Chapter ASM and the American Welding Society on Sept. 17.

We can weld metals because they are among the leading materials which can be melted and used over again. Fusion welding is analogous to remelting metals into new and useful shapes or forms. The introduction of coated rods shortly after World War I has increased elongation in ferrous welds from approximately 10% to 30% in 2 in. These improved physicals have promoted welding from its former rank of maintenance and repair to an important time-saving production tool.

Plasticity of metallic crystals, combined with an urge to contaminate one another in the molten state, is responsible for proper welds and can be used to advantage. A photomicrograph illustrated how ductility of crystals in a phosphor bronze weld can improve structures through cold working or peening followed by heating to above the recrystallization temperature. Several layers or passes are required to fill a gap. A peening operation follows each pass, crystals are deformed, and very slight difference is visible between structures of the weld and the parent metal. Welds which were not peened afterward showed a marked difference.

Professor Johnson then described the role pressure welding plays in powder metallurgy. The plasticity of metals is definitely used to advantage here. Iron, for instance, is heated to a sintering temperature of 1900° F. at 100 psi. in a reducing atmosphere of hydrogen. The crystals, under pressure, deform and are brought into close contact. Galling commences and diffusion, greatly aided by heat, occurs. Nuclei of new particles take form between the crystals upon application of heat and interfaces of one join another in a bond known as recrystallization. A mass of loose powder has been transformed into a solid, useful article.

French Metallurgists Need Help
(as do all French except Black Marketeers)

AMERICAN metallurgists can do a good deed by sending a small package of food monthly to some professional brother in France. The gift box ordinarily used for overseas soldiers is the right size—maximum weight 5 lb., length 12 in., circumference 36 in. It should contain soap, coffee, sugar, edible oil or fat, concentrated food. If you have no French friend, the ASM will provide you with a name and address.

Actual Case Histories of Heat Treatment By Isothermal Diagrams Discussed

Reported by Ed. J. St. Eve
District Manager, Ampco Metal, Inc.

The theory of the isothermal transformation and interrupted quenching of steels was presented by means of slides and diagrams to the St. Louis Chapter on Sept. 21 by E. S. Davenport, assistant to the vice-president in charge of research and technology, United States Steel Corp.

Mr. Davenport discussed actual cases of the heat treatment of many types of SAE and NE steels in terms of the isothermal diagram or the S-curve, proving that the properties of steels can definitely be controlled. The greatest usefulness of these diagrams is in the fact that it helps to create a new basis on which to do our thinking in developing heat treated steels.

After the regular meeting a short film previewed the subject of "Drop Forging", to be presented in October.

Rose Heads Latrobe's New Boston Office

Robert S. Rose has been appointed district sales manager of the new office opened by Latrobe Electric Steel Co. in Boston. Territory covered from the new office comprises Eastern Massachusetts, Rhode Island, New Hampshire and Maine.

Mr. Rose is well known throughout New England, having been in tool steel sales in that area for the past nine years. He is a past chairman of the Boston Chapter ASM, and is a member of the AIME. A graduate of University of Pittsburgh, he also attended the Graduate School of Metallurgy at Carnegie Institute of Technology.

FOR SALE
Brown Furnace Atmosphere Analy-Graph
The Weatherhead Co., Cleveland, Ohio

Federal Sponsorship Of Science Foundation Urged by MacQuigg

Reported by R. E. Christin
Chief Metallurgist, Columbus Bolt Works

The need for a National Science Foundation was ably presented to the Columbus Chapter on Sept. 11 by a fellow member, Charles E. MacQuigg, dean of the College of Engineering, and director of the Engineering Experiment Station of Ohio State University.

Going back to the Morrill Act of 1862 and subsequent legislation which established the Land Grant Colleges (known as the "poor man's college"), the speaker cited the success of the Agricultural Experiment Stations such as at Wooster, Ohio, under federal aid. Dean MacQuigg outlined a program for scientific research and development which would answer the need for progress in the postwar era. Because of the dearth of student training in scientific development during the past six years, he pointed out that scholarships and fellowships sponsored by the government would aid materially in supplying future scientists.

Four Problems to Solve

In developing this program four major questions were raised in a letter by the late President Roosevelt to Dr. Vannevar Bush, director of the Office of Scientific Research and Development. They were:

1. How to make known, with the approval of military authorities, the contributions to scientific knowledge which have been made during our war effort?
2. What can be done now to organize a program in medicine and related sciences?
3. What can the Government do to aid research activities by public and private organizations?
4. Can an effective program be proposed for discovering and developing scientific talent in American youth?

In reply, Dr. Bush appointed four separate committees, composed of leading scientists, whose reports were published in book form, known as "Science, the Endless Frontier". This compilation of ideas was presented to President Truman in July 1945, and scientific development was thereby made one of the "must" items in Mr. Truman's program, recently submitted to Congress.

Senate and House Bills Proposed

Dean MacQuigg oulined several bills now pending in both the Senate and the House of Representatives. For example, Senator Byrd (S825) and Representative May (HR3440) advocate the organization of scientists and military men to continue scientific research on military matters alone. Senator Magnuson (S1285) and Senator Kilgore (S1297) advocate the establishment of a National Foundation as an independent agency to promote scientific research and education, including military matters.

Complete credit for the work of science can only be found in the battlefields. Contributions by the various organizations toward better munitions and equipment, such as guns, shells, bombs (including rocket and atomic), tanks, planes, ships, and radar, may perhaps never become known. Therefore, a clearing house for technical publications in peacetime was declared as essential.

Lively discussion followed in the open forum on the subject of a National Science Foundation, participated in by Dr. Barbulesco of Antioch College (a guest), Prof. Dana Demorest of Ohio State, Messrs. Schnee, Hasse, Hoyt (who had just returned from a three months' survey of German steel plants), Lorig, Sims, Crout, and Smith from Battelle Institute, Parks, of D. L. Auld Co., and a few others whose names were not recorded.

Rustless Steel Names Watkins Manager of Market Development Div.

Rustless Iron and Steel Corp., Baltimore, has announced the appointment of Stanley P. Watkins as manager of the Market Development Division. For the past year Mr. Watkins has been manager of the sales engineering department at Rustless and prior to that time he was head of the sales development department and also served as an engineer in that department.

S. P. Watkins

He joined the Rustless organization in 1931 as a metallographist in the laboratory. Mr. Watkins is a graduate of Birmingham Southern College and also studied metallurgy at Carnegie Tech. He is a member of the Publications Committee of the American Society for Metals, a past chairman of the Baltimore Chapter, and a member of the American Society for Testing Materials and the American Institute of Mining and Metallurgical Engineers. In 1939 he received the annual award of the Wire Association.

W. R. Shimer Retires, Was 38 Years at Bethlehem

Retirement of W. R. Shimer, metallurgical engineer in charge of sheet, strip and tin mill products, Bethlehem Steel Co., has been announced, effective Oct. 1. Mr. Shimer has been with Bethlehem Steel 38 years. Appointment of Felix F. Aloi, assistant metallurgical engineer, to succeed Mr. Shimer, was also announced.

W. R. Shimer

During his years with Bethlehem Steel, Mr. Shimer had a part in originating and developing many metallurgical advances. He also, in 1912, participated in instituting the metallographic department, forerunner and nucleus of the present metallurgical department, and in establishing the company's observer system.

Mr. Shimer was a charter member of the Lehigh Valley Chapter of the American Society for Metals, which he helped organize 25 years ago. He was a member of various other technical societies, served on a number of committees, and has contributed numerous articles to technical journals.

F. F. Aloi

Mr. Aloi came to Bethlehem Steel Co. in 1932 when Bethlehem acquired the Seneca Iron & Steel Co. of Dunkirk, N. Y., by whom he had been employed as a chemist. He was stationed until 1938 at Bethlehem's Lackawanna, N. Y. plant, when he was transferred to the Bethlehem, Pa. offices as assistant metallurgical engineer under Mr. Shimer in the sheet, strip and tin mills.

Educational Program Studies Trends in Metallurgy

"Current Trends in Ferrous Metallury" is the subject of the first half of the educational program of the New York Chapter of the American Society for Metals for 1945-46. A series of four lectures will cover the changes that have taken place in the ferrous metallurgy field and the uses of low carbon, SAE, NE, tool and stainless steels. Dates and speakers are:

Oct. 29—Low Carbon, Open-Hearth and Bessemer Steels, by C. M. Lichey, Jones & Laughlin Steel Co.

Nov. 12—SAE and NE Steels, by N. E. Woldman, Eclipse-Pioneer Div., Bendix Aviation Corp.

Nov. 19—Tool Steels, by S. C. Spalding, American Brass Co.

Nov. 26—Stainless Steel, by W. H. Mather, Allegheny Ludlum Steel Corp.

The second half of the educational program, to be held next April, will cover "Current Trends in Copper and Light Alloys" (two lectures), and "Current Trends in Protective Coatings" (two lectures). All lectures are held at the Commerce and Industry Association of New York at 7:00 p.m.

Turbo-Supercharger Buckets Of "Vitallium" Mass Produced By Precision Casting

Reported by Willard R. Sweet
Tool Engineering Department, International Business Machines Corp.

Opening a discourse on the "lost wax" method of casting before the Southern Tier Chapter ASM at the first meeting of the 1945-46 season, H. P. Gray, president of the Gray Mfg. Co., Syracuse, N. Y., outlined the historical background of the method in connection with the European development of bronze statuary. A short description of the dental industry's adaptation of this process to the pouring of small castings using fractions of an ounce of metal followed. General Electric Co. expanded this method to mass-produce aircraft engine turbo-supercharger buckets of "vitallium", a strong heat resistant alloy that meets the severe service requirements of the supercharger under wartime conditions.

The speaker next compared part and tooling costs of precision castings with die castings and powder metals, stating the advantages and disadvantages of each, their relative competitive positions, and the fields the three processes serve. Precision casting has the added advantage of a wider range of alloys.

At the present time Gray Mfg. Co. is maintaining production tolerances of ± 0.005 in. per in. of length in precision castings varying in weight from less than 1 oz. up to 3 lb., and with maximum dimension up to 5 in. Metal is melted in a 30-kw. converter type induction furnace using a controlled atmosphere. A wide variety of alloys is used, ranging from aluminum through brass, beryllium-copper, manganese bronze, low and high carbon steel, nitralloy, stellite, and stainless steels.

Plain carbon steel castings poured in the hot (1500 to 1800° F.) ceramic molds show excellent properties, having high ductility and no porosity; they are equal in every way to parts machined from bar stock. Normal heat treatments may be used on these castings to obtain fine grain and improve strength and wearing qualities.

In conclusion, the speaker emphasized that by careful study in allowing for shrinkage of wax and metal, molds for waxes can be made that would produce accurate castings within tolerances in quantities up to 10,000 or more.

In the question period that followed the talk it developed that X-ray equipment assists in the precision casting process by showing voids and other internal flaws that may appear in the first trial runs of castings. Metal is poured in the hot ceramic mold while the mold is rotating; centrifugal force thus produced assures complete filling of the mold cavity. Speed of rotation varies with different alloys used.

Leaves Midvale to Become Sales Manager

Frederick Cooper, secretary of the Philadelphia Chapter of the American Society for Metals, has resigned as assistant superintendent of the research department of the Midvale Co. to become sales manager of Wilson Steel & Tool Co., Philadelphia.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Nov. 19		C. S. Barrett	Metallography Now
Birmingham	Nov. 6	Birmingham Heat Treating Co.	Wm. Vaughn	Precision Heat Treating
Boston	Nov. 8	Hotel Bradford	Frank Curtis	Induction Heating for Hardening and Brazing
Cedar Rapids	Nov. 13	Hotel Roosevelt	C. H. Jennings	Distortion Problems in Welding
Chicago	Nov. 8	Chicago Bar Association	O. J. Horger	Metallurgy and Design
Cleveland	Nov. 2	Cleveland Club	C. H. Herty, Jr.	Steel Making Practice as It Affects Properties of Interest to the User
Columbus	Nov. 13	Ft. Hayes Hotel	C. L. Faust and E. E. McSweeney	Protective Coatings
Hartford	Nov. 13	Hartford State Trade School		
Indianapolis	Nov. 19		A. L. Boegehold	Selection of Steels for Automotive Parts
Los Angeles	Nov. 22	Southern Calif. Gas Co.	H. L. Harvill	Die Casting
Mahoning Valley	Nov. 13		C. A. Zapffe	Fractography
Milwaukee	Nov. 20	Athletic Club	Gordon LeBrasse	Bearing Metals
Montreal	Nov. 5		G. S. Farnham	Canada's Modern Experimental Laboratory
New Haven	Oct. 25	Connecticut Light & Power Auditorium, Waterbury	R. M. Baker	Induction Heating of Non-Ferrous Alloys and Plastics
New Jersey	Nov. 19	Essex House, Newark	E. V. Crane	Status of Science in Metal Working
New York	Nov. 5	Building Trades Bldg.	Robert F. Mehl	World-Wide Metallurgy
Northwest Pa.	Nov. 29	Meadville, Pa.	R. W. Thomas	Tools and Their Maintenance
Notre Dame	Nov. 14	Engineering Auditorium, Univ. of Notre Dame	J. O. Almen	Effect of Residual Stresses on the Fatigue Strength of Metals
Ontario	Nov. 2	Toronto	A. E. Byrne	Recent Developments in Plastics
Philadelphia	Oct. 26	Engineers' Club	J. W. Cable, H. B. Osborn, Jr., Otto Weitman	Induction Heating
Philadelphia	Nov. 30	Engineers' Club	C. H. Herty, Jr.	Steel Making Practice as It Affects Properties of Interest to the User
Pittsburgh	Nov. 8	Roosevelt Hotel		Young Fellows' Night
Pueblo Group	Nov. 15	Pueblo, Colo.	A. B. Kinzel	New Techniques of Welding
Puget Sound	Nov. 14	Athletic Club	Manuel Tama	
Rhode Island	Nov. 7	Engineering Bldg., Providence	P. Payson	Modern Viewpoint on the Annealing of Steel
Rocky Mountain	Nov. 16	Denver, Colo.	A. B. Kinzel	New Techniques of Welding
Saginaw Valley	Nov. 20		V. W. Sherman	Induction Heating
Springfield	Nov.			Electric Salt Bath Furnaces in Modern Heat Treating
St. Louis	Nov. 16	York Hotel	Prof. Charles S. Barrett	X-ray Micrographs
St. Louis	Nov. 29	Engineers' Club		Magnesium
Toledo	Nov. 21			Recent Advances in Carburizing
Warren	Nov. 8	IOOF Hall	M. Gensamer	Mechanical Properties and the Constitution of Alloys
West Michigan	Nov. 19		W. A. Hambley	Properties of Cast Iron
York	Nov. 14	Steelton at Harrisburg, Pa.		

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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Ray T. Bayless ..... *Editor*
M. R. Hyslop ..... *Managing Editor*

Cleveland, Ohio—October, 1945
Volume XVIII Number 10

Dr. Parks Joins Staff At ASM Headquarters

A new addition to the staff of the American Society for Metals is John M. Parks, who comes to the ASM from Rensselaer Polytechnic Institute. Dr. Parks will serve as editor of the technical books published by the Society.

Dr. Parks received his Bachelor of Science degree in Chemical Engineering from Purdue University and his M.S. in Metallurgical Engineering and Ph.D. from Rensselaer.

John Parks

Since 1939 he has been engaged in teaching and research at Rensselaer and had a varied part in the war research program of the Metallurgy Department. His studies in this activity included the seam welding of steel to aluminum, spot welding of hardenable steels, and the melting, rolling and heat treatment of experimental magnesium alloys. He has also served as consultant for various industries in such fields as corrosion studies, X-ray diffraction studies, heat treating of steel, inclusions in steel, welding failures, and analysis of electroplating addition agents.

In his new duties at the ASM Dr. Parks will also assist in the work of the Educational Committee and will plan and prepare lecture series for use by the chapters.

Sigma Phase as Cause of Stainless Failures Explained

Reported by W. T. Rubin
Metallurgist, Copperweld Steel Co.

Various types of straight chromium and chromium-nickel stainless irons and steels were discussed by F. B. Foley, director of research, The Midvale Co., before the Warren Chapter on Sept. 13.

Discussing the delta iron phase sometimes encountered in the chromium-nickel types, the speaker stated that the elements phosphorus, aluminum, vanadium, silicon, molybdenum, tungsten, and chromium all tend to cause retention of this phase, whereas carbon, manganese and nickel tend to eliminate it.

In the opinion of the speaker, one of the most commonly overlooked factors in stainless steel is the sigma phase. This phase was discovered in 1927 by Bain and Griffiths who reported that it was a non-magnetic, brittle, corundum-hard constituent. Subsequent research has produced several iron-chromium-nickel ternary diagrams illustrating the percentages susceptible to the formation of the sigma phase, and most of these diagrams were illustrated and explained.

Sigma phase, which is assumed to be FeCr, transforms to alpha iron when heated above 1700° F.; the reversion of alpha to sigma can be prevented by rapid cooling from above 1700° F. The transformation of alpha to sigma is very sluggish, however, and sometimes takes weeks or months to occur. The formation of the sigma constituent would therefore often explain the failure of stainless steel parts after being in service at elevated temperatures for long periods of time. The speaker gave several examples of stainless steel failures due to the sigma phase.

Scheid Addresses West Michigan

West Michigan Chapter's first meeting of the '45-46 season was addressed by A. J. Scheid, Jr., chief metallurgist of the Columbia Tool Steel Co. (second from left). Mr. Scheid's program included two reels in color showing tool steel manufacture, followed by a paper on the principal types of tool steels. In the photograph, left to right, are: C. H. Lloyd, past chairman of the Chapter; Mr. Scheid; R. L. Edison, chairman; and Donald A. Paull, secretary.

Pepin Discusses Forgings For Air Engines, Propellers

Reported by Edward P. Jackson
Metallurgist, The Tool Steel Gear and Pinion Co.

The inspection, forging, and subsequent heat treating of several intricate designs of forgings used in aircraft engine and propeller assembly formed the subject of an interesting talk before the Cincinnati Chapter ASM on Sept. 13, by A. J. Pepin, chief metallurgist, Wyman-Gordon Co., Worcester, Mass.

The steels as received are rigidly inspected, marked with code numbers for identification, tested for chemical analysis, micro-etched, and tested for cleanliness, hardenability, grain size, and mechanical properties.

The speaker then elaborated on methods of heat treating various steels by oil, air, or water quenching, drawing and hardness testing.

After the talk a movie film on the subject of "Forging and Heat Treatment of Aircraft Engine Parts" was shown, as well as a technicolor film covering the inspection, assembly, and operation of an aircraft engine and propeller assembly taken at Quonset Point, R. I., Naval Training Base.

Some of the points brought out in Mr. Pepin's talk are reported in an article in METAL PROGRESS for June 1945.

Stagg Stresses Importance Of Cooling Range Below 400°

Reported by Arnold L. Moore
Chief Metallurgist, Unit Drop Forge Div., Fuller Mfg. Co.

A frank and practical discourse was presented on Sept. 18 to the Milwaukee Chapter ASM by Howard J. Stagg, metallurgical sales, Tool Steel Division, Crucible Steel Co. of America, on the subject "Tools and Tool Steels".

Good tool design with special regard to selection of material, proper filleting, keyways, and balanced sections, is of prime importance as a measure to avoid anything that will promote stresses, Mr. Stagg emphasized.

Particular attention in the majority of our modern heat treating shops is given to atmosphere control furnaces and exacting temperature control. Great care is applied to transferring from preheat to high heat and properly soaking at temperature. One phase badly neglected, however, is the quenching tank, and the cooling range below 400° F. upon quenching.

Martensite transformation begins in a 0.90% carbon tool steel at about 400° F. Transformation is progressive to room temperature depending upon nature and composition of austenite. The single most important aspect of the entire procedure, Mr. Stagg emphasized, is the proper time to start tempering. This point he defined as that temperature where it is possible to "shake hands" with the part—when it can be grasped yet is uncomfortable to handle.

Concentration of stress will make the part weaker regardless of its actual strength. The failure to appreciate the difference between strength and stiffness is prevalent and disastrous.

Other aspects, such as martempering, straightening between 400 and 200° F., conditioning of austenite, annealing before rehardening and sub-zero treatment for stability, were discussed with clarity and comprehension.

Frey Joins Allis-Chalmers Tractor Division

Muir L. Frey has resigned as chief metallurgist of the Aircraft Engine Division, Packard Motor Co., to become associated with the Allis-Chalmers Mfg. Co., Milwaukee, as assistant to the general works manager, Tractor Division. Mr. Frey is resigning the vice-chairmanship of the Detroit Chapter ASM, to which he was recently elected, to affiliate with the Milwaukee Chapter.

Martin Describes G.E. Studies on Metallurgy Of Induction Hardening

Reported by R. Smoluchowski
Research Laboratory, General Electric Co.

Extensive material based primarily on his own recent research into the metallurgical processes on which induction hardening is based was presented by D. L. Martin of the General Electric Research Laboratory, Schenectady, at the first meeting of the Eastern New York Chapter.

After a brief summary of the fundamentals of the experimental technique, Dr. Martin discussed in detail the process of austenitization which has to take place in the metal prior to hardening, and the subsequent quenching process during which the austenite is partially or totally transformed into martensite. The author stressed the fact that the phenomena which take place here during heating and quenching are essentially the same as those which occur on slow heating and subsequent quenching. The difference is due to the time factor which influences the austenitization process.

For completion, the latter requires a certain minimum time at each temperature above the critical temperature. The shorter the time before quenching the higher the temperature gradients and carbon concentration gradients. These affect the properties of the material obtained. The influence of temperature and of time on the properties of the hardened layer is at least qualitatively understandable in terms of the diffusion process of carbon in iron —the fundamental mechanism of all these phenomena.

Out of his collection of experimental data, Dr. Martin chose five characteristic steels from pure carbon to a highly alloyed steel, and compared the results obtained on all of them under similar induction hardening conditions. The depth at which full or half hardness occurs was measured for these steels as well as the time and temperature necessary to obtain a specific hardened layer.

The lecture was followed by a lively discussion in which the questions ranged from highly "fundamental" inquiries into the atomic mobility of the carbon atom to the question of economical aspects of induction hardening.

Warm applause was also given to Mr. Efner, a well-known historian who preceded the main speaker with an interesting account of the early history of Schenectady.

Frozen Mercury Used in New Type Precision Casting

Reported by A. P. Barone
Metallurgist, Minneapolis-Moline Power Implement Co.

"Heat Resistant Alloys in Jet and Turbo Engines" was the subject presented by H. H. Harris, president of General Alloys Co., Boston, at the first meeting this season of the Northwest Chapter, on Sept. 13.

Jet and turbo engines made demands on high temperature materials greatly beyond any previous application or experience, Mr. Harris pointed out. Engineers experienced in mechanical applications of high temperature alloys, such as high temperature tooling, were largely ignored. Castings were made to mill product specifications for malleable and rollable materials rather than designed to utilize the stronger alloys which can be cast but which are rolled with difficulty.

So-called "precision castings" made in toy furnaces were unpredictable as to fatigue failures. Certain types of forged blades were satisfactory but would swamp the forging and die sinking facilities.

One new approach was castings made with frozen mercury as a disposable pattern in a new type of mold material with unique melting controls. The mercury pattern was heated by induction in the mold to bake the mold from the inside out.

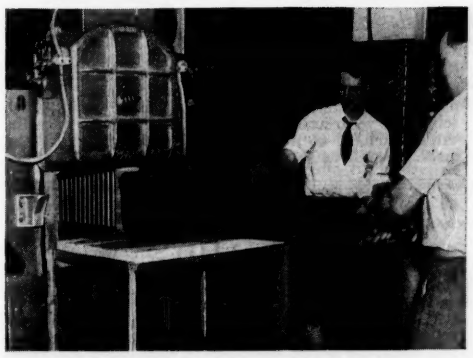
Mr. Harris displayed a variety of precision castings made by various processes and made a turbine blade pattern in mercury frozen at −70° C. on the rostrum, which he exhibited to the audience.

French Returns to International Nickel

H. J. French, a past president of the ASM, has resigned as assistant director for raw materials and facilities of the Steel Division, War Production Board, at Washington, D. C., and has resumed his duties as assistant manager of the Development and Research Division of the International Nickel Co., Inc., New York.

Mr. French joined the Iron and Steel Branch of the War Production Board in 1942 when he became chief of the metallurgical section. With the formation of the Steel Division he became chief of the metallurgical branch and in March 1944 was appointed assistant director.

Hartford Trade School Expands Curriculum



W. E. Bancroft (left) instructs student in the art of box carburizing in an electric furnace.

(Continued from page 1)

Russell J. Haigis, W. E. Bancroft, W. W. Wight, Arthur Levy, and E. F. Bradley.

Students were obtained by circularizing the industrial plants in this area. In most cases, applicants were selected by the management. Applications were so numerous that a waiting list had to be established.

Two textbooks were used for the course in "Elementary Metallurgy and Heat Treating"—namely, M. A. Grossmann's "Principles of Heat Treating" and Frank R. Palmer's "Tool Steel Simplified". Using modern commercial furnace equipment, the students were taught to perform such operations as direct hardening, tempering, carburizing, annealing, and normalizing, etc. Much emphasis was placed on the proper use and maintenance of automatic temperature control equipment and several sessions were devoted to the many metallurgical testing devices with which this department is equipped.

In the advanced courses in "Alloy Constructional Steels" and "Tool Steels", practical problems were worked out, and some of the newer procedures, such as isothermal annealing, austempering, and martempering, were demonstrated and explained. These courses were based on the ASM textbooks "Alloy Steels" by Bain, and "Tool Steels" by Gill, Morrison, Roberts, and Rose.

On June 18 an informal dinner meeting was held at the Trade School at which 94 certificates were presented to the students who had completed one or more of the courses. It is felt by all members of the Hartford Chapter that through the medium of these courses the ASM has contributed materially to the successful prosecution of the war.

While it is the ultimate intention of the Hartford Trade School to incorporate the facilities of this heat treating and inspection department into the regular day school curriculum, it is nevertheless planned that evening classes for the upgrading of workers in industry as well as for returning veterans will be presented again during the coming winter, with ASM instructors as before.

Pavesic Now Metallurgist for Lindberg

Edward J. Pavesic, 1944-45 chairman of the Fort Wayne Chapter ASM, and formerly with the Studebaker Corp., is now a metallurgist for the Lindberg Steel Treating Co., Chicago.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of **The Metals Review**, published monthly at Cleveland, Ohio, for October 1, 1945, State of Ohio, County of Cuyahoga, ss. Before me a Notary Public in and for the State and county aforesaid personally appeared Ray T. Bayless, who, having been duly sworn according to law, deposes and says that he is the Editor of **The Metals Review** of the American Society for Metals, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations to wit:

1.—That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Editor, Ray T. Bayless, 7301 Euclid Ave., Cleveland; Managing Editor, M. R. Hyslop, 7301 Euclid Ave., Cleveland, O.; Business Manager, Ray T. Bayless, 7301 Euclid Ave., Cleveland, O.

2.—That the owner is: The American Society for Metals, 7301 Euclid Ave., Cleveland, O., which is an educational institution, the officers being: President, K. R. Van Horn; Vice-President, C. H. Herty, Jr.; Secretary, W. H. Eisenman; Treasurer, H. D. McKinney; Trustees: A. L. Boegehold, R. W. Schlumpf, A. E. Focke, L. S. Bergen, M. A. Grossmann. All officers as above, 7301 Euclid Ave., Cleveland, Ohio.

3.—That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4.—That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Ray T. Bayless, Editor.

Sworn to and subscribed before me this 1st day of October, 1945. (Seal) Arthur T. Wehrle, Notary Public. (My commission expires Jan. 20, 1947.)

Georgia Chapter Aids In Relocation of Personnel

Reported by Michael F. Wiedl
Managing Editor, Southern Machinery and Metals

Do you need a job?

Do you need a specialized man for a specific job?

Those two questions have been given considerable thought by the Executive Committee of the Georgia Chapter ASM. In order to expedite the employment of ASM members and aid business to return to peacetime operations as rapidly as possible, the following program has been outlined.

First, Chairman Weatherwax plans a survey of Georgia industry to determine just what kind of personnel is desired in reconversion and postwar planning. He will contact management throughout the state and screen the requisitions.

Secondly, those who have been affected by cutbacks or who will soon be given the proverbial "pink slip" may submit their qualifications and requests for employment to Chairman Weatherwax.

There will be no obligation on the part of the employer or employee to ASM. It is the aim of the chapter to channel the proper manpower into the industries of this section so that needless relocation will be avoided. This program is being initiated to forestall the movement of skilled manpower from this section.

Chairman of Board of Hunt Co. Dies, Was With Organization 52 Years

J. C. Ogden, chairman of the Board of Directors of Robert W. Hunt Co., died in Plainfield, N. J., on Sept. 10, at the age of 78. Mr. Ogden had been associated with the Hunt organization for the past 52 years. He was vice-president of the company from 1923 to 1935, and president from 1935 to March 1945 when he was elected chairman of the Board of Directors. He was a member of the American Society for Metals, the American Society of Civil Engineers, and the American Society for Testing Materials.

John E. Miller

John E. Miller, general superintendent of the Bethlehem Steel Co.'s strip mill in Lackawanna, died Aug. 24 in Buffalo General Hospital after an illness of ten days. Born 40 years ago in Belle Vernon, Pa., he was an executive committee member of the Buffalo Chapter ASM.

Robert Atkinson

Robert Atkinson, Detroit district manager since 1927 of the Steel and Tube Division of The Timken Roller Bearing Co., died Aug. 26 after a month's illness. Aged 53, Mr. Atkinson received a Bachelor of Science degree from the University of Michigan in 1914 and the following year a Master of Science degree in chemical engineering. He was a member of the Detroit Chapter ASM.

Boston Opens Season With Outing

Reported by Peter R. Kosting
Watertown Arsenal

The Boston Chapter ASM started its season with a "Victory Outing" on Sept. 15, at the United Shoe Machinery Athletic Association Clubhouse in Beverly, Mass. Many participated in the sports events, which included golf, tennis, horseshoes, baseball, and bowling. Gambling for phoney money was another popular feature. Prizes for the winners of various events and door prizes were donated by many firms. Each member on the M.I.T. baseball team, which played the New England Metallurgical Corp. team and won the game 11 to 9, was awarded a toy motorboat to sail in the Charles River Basin.

Chairman Ray G. Sault welcomed all to the outing and outlined plans for future meetings.

New Movie Traces History of Copper

A new industrial motion picture, "Golden Horizons", has been produced by Ampco Metal, Inc., Milwaukee, Wis. It is a 16-mm. film in color with narration and sound, and was entirely written, produced and acted by Ampco employees.

In the film is shown the development of copper-base alloys from the first discovery of copper by primitive man. The alloying of bronze and its growing importance are colorfully portrayed. It is available for showing before technical groups and inquiries should be addressed to Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 4, Wis.

Rustless Merger Into Armco Announced

Charles R. Hook, president of the American Rolling Mill Co. and chairman of the Board of Directors of Rustless Iron and Steel Corp., has announced an agreement between the two corporations providing for the merger of Rustless into Armco. The merger will become effective at the year-end, when Armco intends to operate the Rustless plant at Baltimore as the Rustless Iron and Steel Division.

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Authors: N. E. Woldman and R. J. Metzler

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A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month. Prepared by Thelma Reinberg, Librarian

1. ORES & RAW MATERIALS

Production; Mining; Beneficiation

1-35. The Melting Point of Manganese and Iron Ores. John J. Howard. *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 971-972.

Behavior of the various ores in the furnace. The ideal condition for chemical reaction is the gaseous phase, because the reagents are miscible in all proportions and molecular contact is possible to the greatest extent.

1-36. Modern Electro-Treatment Processes for the Extraction of Minerals. A. G. Robiette. *Metal Treatment*, v. 12, summer '45, pp. 116-127.

Survey of those electro-thermal processes for the extraction of minerals which might profitably be developed in this country. The prospect of such development is considered in relation to the scheme for the production of large quantities of cheap hydro-electric power in the Highlands. Importance of electro-thermal processes from national point of view; electro-thermal processes; electrodes; furnaces; calcium carbide; ferro-alloys; ferrochrome; magnesium; abrasives and refractories; graphite and carbon products; phosphorus.

1-37. A Rapid Method of Ore Testing: The "S.K." Porosity Test. Iron and Steel Institute, Advance Copy, July '45, 10 pp.

Apparatus described for the rapid determination of the porosity of ores by what is known as the "S.K." (South Kensington) test. Principle of the test is to fill the voids in turn with mercury, air, and water; for porous materials the voids are greatest for air, less for water, and least for mercury. The differences between the values are a measure of the porosity relative to the fluids employed. Several specimens of ore and sinter were examined. Ores are more porous than sinters, while the voids of mixtures are additive. It is shown how the measurements can be applied to forecast the behavior of materials in the blast furnace (deoxidation and carbon deposition).

1-38. Future Copper Production From Low-Grade Ores. Harmon E. Keyes. *Mining Journal*, v. 29, Sept. 15, '45, pp. 5-7, 41.

To avert a future copper shortage exploitation of marginal and refractory copper ores will be necessary. It is believed that this may be achieved, at least in part, by leaching of marginal grade ore in dumps or stopes, and treating milling grade "mixed" ore by the leach-precipitation-flotation process. For this process the production of a cheaper leaching solvent, namely, ferric sulphate and sulphuric acid, is a prime requisite. 43 ref.

1-39. Sinters and Sintering—Part I. H. L. Saunders and H. J. Tress. Iron and Steel Institute, Advance Copy, Aug. '45, 13 pp.

Sinter in the blast furnace burden is beneficial in spite of its lower reducibility as compared with ore. Differences in the behavior of ore and sinter towards furnace gas are considered. Some of the changes occurring during the various stages of sintering are outlined, with special reference to the effect of temperature on porosity and strength. In usual commercial practice the bonding temperature is far too high, with the result that unnecessary slagging and loss of porosity result. Need for closer control is stressed, and various suggestions for modifications to existing plant are made.

1-40. Sinter Plants. C. J. Duby. *Iron and Steel*, v. 18, Aug. '45, pp. 379-382.

Design and operation. (American Iron and Steel Engineers.)

1-41. Alumina From Low-Grade Bauxite. Robert F. Gould. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Sept. '45, pp. 786-802.

Red mud slurry is ground with limestone and soda ash and kilned at high temperature; the sinter is leached with water, and the filtrate is passed into the process liquors of the Bayer process where alumina and soda ash are recovered. Various economic factors and future possibilities of the process are considered.

2. SMELTING AND REFINING

2-94. Application of pH Slag-Basicity Measurements to Basic Open-Hearth Phosphorus Control. Michael Tenebaum and C. C. Brown. *Metals Technology*, v. 12, Aug. '45, T.P. 1863, 10 pp.

Factors considered in applying the pH measurements to actual slag control and some of the results of its application.

2-95. Effect of Ingot Delivery Time as a Factor in Quality of Bessemer Steel. Howard C. Dunkle. *Metals Technology*, v. 12, Aug. '45, T.P. 1878, 10 pp.

Apparent similarity of the frequency-distribution curves for blows with and without rejections shows how little one factor can account for steel quality. Effect of finish strip to finish charge time is considerably more important than the ingot delivery time for the same length of time. Best quality for high sulphur steels (B1112, B1113, and C1117) is obtained when the ingot delivery time is the shortest, or from ingots charged into the pits as cold steel. 5 ref.

2-96. The Mechanical Phase of Open-Hearth Steel Manufacture. Folke Sundblad. *Iron & Steel Engineer*, v. 22, Aug. '45, pp. 51-58.

Improvement in the mechanical factors of the open-hearth process has given marked operating economies. The unstable relation between the prices of scrap and pig iron act against new charging methods which might lead to heavier scrap charges.

2-97. The Blast Furnace Burden. Theodore Powell. *Metallurgia*, v. 32, July '45, pp. 121-125.

Economical production of good quality steel depends to a large extent on the production of suitable irons from the blast furnace and, while many factors in the furnace operation influence the economical production of suitable irons, the burdening of the furnace probably has the most important influence. The blast furnace determines the character and quality of the pig iron produced, thus it has a direct influence on the costs incurred in producing steel. Discusses the subject in relation to steel-works requirements and the ideal burden.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the ASM Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-35-39; **2**-94-95-96-99-101; **3**-165; **6**-116; **10**-70-71-78; **16**-111; **23**-228; **26**-135-136-137.

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3-154-161-162; **12**-206; **14**-258-267-268-288; **18**-203-206-211-226; **20**-398; **23**-242.

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3-164-170; **14**-274-277-280-292; **22**-517.

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3-151-160-173-177-179; **18**-205-208; **20**-413; **22**-476.

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3-151-152-158-164; **18**-205; **20**-393-413; **22**-469; **23**-215-217.

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3-174-180; **5**-41; **12**-182; **18**-225; **19**-260-271; **20**-392-403.

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1-41; **3**-157-166-175; **6**-121-123; **7**-208-212-217; **9**-107-111; **10**-71-73; **14**-273-275-285-296; **15**-31; **16**-110; **18**-207; **19**-267; **20**-398-401; **22**-470-474-482-484-511; **23**-219-220-221-222-225-227-239-241; **24**-83; **26**-133.

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3-172-176; **6**-118; **8**-107-108; **14**-287; **23**-235; **26**-128-129.

Zinc and Zinc Alloys

3-175; **6**-117; **7**-197-202-209-216; **10**-77; **14**-263; **16**-118; **19**-257; **22**-501; **27**-142.

Miscellaneous and Minor Metals

2-103; **8**-110; **19**-254; **21**-74; **23**-218; **26**-132-134.

2-98. Ferro-Alloys Used in Steel Making. *Metals & Alloys*, v. 22, Aug. '45, pp. 455, 457.

Commercial forms and uses; summary of specifications for ferro-alloys.

2-99. Deoxidizing a Heat of Acid Electric Steel. Conrad C. Wissmann. *Metal Progress*, v. 48, Sept. '45, pp. 499-504, 530.

Confined to the means a melter has of cleaning the steel of the impurities which are in it before it is tapped; carbon the best deoxidizer.

2-100. The Production of Magnesium, Part II. *Industrial Chemist*, v. 21, Aug. '45, pp. 419-426.

Survey of the process developed by Magnesium Elektron, Ltd. Proportioning; chlorinator house; charging; hydrochloric acid recovery; cell house; neutralization house; research laboratories.

2-101. Slags and Slag Control in Basic Open-Hearth Furnaces Using Phosphoric Iron. *Industrial Heating*, v. 12, Aug. '45, pp. 1352, 1354.

Illustrates the chronological development of a slag control method, designed first for use during refining, but subsequently enlarged to embody also the charging of lime in furnaces using high percentages of molten phosphoric iron.

2-102. Considerations on Blast Furnace Practice. T. P. Colclough. *Blast Furnace & Steel Plant*, v. 33, Sept. '45, pp. 1101-1105.

Efficiency of carbon in the furnace; conditions for equilibrium; application of carbon-efficiency principles; reduction of heat requirement in the blast furnace.

2-103. Beryllium and Its Alloys. W. J. Kroll. *Metal Industry*, v. 67, Sept. 7, '45, pp. 148-149.

Production of beryllium metal and its alloys is one of the most difficult tasks in metallurgy. Examines the progress made in this work in the last 15 years, taking into account the outstanding publications, including those of the patent literature, and the information obtained during 20 years experience with this metal. (Bureau of Mines Information Circular 7326.)

2-104. Spiegeleisen, Its History, Uses and Purpose. S. E. Maxon, *Steel*, v. 117, Sept. 17, '45, pp. 138, 140, 172, 174.

Iron-manganese alloy produced in this country for past 90 years is available in three grades, all low in phosphorus and varying in manganese and silicon contents. Product finds wide application in acid and basic open-hearth shops for recarburizing and reboiling and for blocking carbon content of heat; also helpful in gray iron and malleable practice.

3. PROPERTIES OF METALS AND ALLOYS

3-151. Automotive Bolts. A. S. Jameson. *Iron Age*, v. 156, Aug. 23, '45, pp. 64-69.

Materials for automotive bolts must combine the properties of plasticity and high yield strength. Since these two properties are in opposition to each other, a compromise must be made in selecting the best functioning material. Properties of low and medium carbon steels and alloy steels as applied to the fabrication of bolts by hot forming or cold heading are discussed.

3-152. Oxide-Metal Layers Formed on Commercial Iron-Silicon Alloys Exposed to High Temperatures. Raymond Ward. *Metals Technology*, v. 12, Aug. '45, T.P. 1832, 15 pp.

Presents the effect of composition, temperature, time, and atmosphere on the type of scale-metal layer obtained and gives some qualitative indication of the effect of these variables on the rates of oxidation. 6 ref.

3-153. Creep Properties of Some Binary Solid Solutions of Ferrite. Charles R. Austin, C. R. St. John and R. W. Lindsay. *Metals Technology*, v. 12, Aug. '45, T.P. 1837, 22 pp.

Describes the results of isolating one microstructural phase, namely ferrite, and studying its creep characteristics in both the unalloyed and alloyed conditions. This should aid in establishing to a large degree the importance of ferrite in the creep behavior of steels consisting of the previously mentioned ferrite-carbide aggregate. 23 ref.

3-154. Alloy Cast Iron. *Canadian Metals & Metallurgical Industries*, v. 8, Aug. '45, pp. 37-38.

Role of nickel and associated alloys in improving properties. High test cast irons; abrasion resistance; cast iron at elevated temperatures.

3-155. Solidification of Metals. Harry A. Schwartz. *Foundry*, v. 73, Sept. '45, pp. 107-108, 210, 212, 214, 216, 218.

Basic principles involved in the transformation of metals from the liquid to the solid state.

3-156. A Case of Embrittlement of Steel. *Monthly Review*, v. 32, Aug. '45, pp. 784-786, 845.

A failed zinc plated spring clip exhibited a stained fracture which was found to be partly intercrystalline in character in localized areas adjacent to spot welds. It is probable that clips with sound, non-martensitic welds, which might be obtained by preheating prior to spot welding, would withstand the zinc plating operation without cracking.

3-157. Aging and Stretching 24S-T Aluminum. Loyis Ecker. *Iron Age*, v. 156, Aug. '30, '45, pp. 36O-36P.

Three tests were conducted to determine what changes in mechanical properties can be obtained when aluminum alloy 24S-T as-received sheets and extrusions are subjected to aging only, giving 24S-T81; and to a treatment involving 2% stretching plus aging, resulting in 24S-T84.

3-158. Post-War Alloy Steels. Edwin F. Cone. *Metals & Alloys*, v. 22, Aug. '45, pp. 392-396.

Survey of the future of alloy steels (and especially of the electric furnace steels) as seen by leading materials engineers and steel mill metallurgists.

3-159. Do Solid Magnesium Alloys Burn? Louis A. Carapella and William E. Shaw. *Metals & Alloys*, v. 22, Aug. '45, pp. 415-416.

Positive scientific proof that no fire hazard whatever attaches to the use of solid (massive) magnesium alloys and parts.

3-160. Free-Machining Open-Hearth Bar Steels. *Metals & Alloys*, v. 22, Aug. '45, pp. 425-428.

Machining and heat treating characteristics and general properties of the six grades of cold finished low carbon open-hearth bar steels selected by the cold finished bar steel industry as standard materials.

3-161. Pearlitic Rim in Malleable Iron. J. E. Rehder. *Canadian Metals & Metallurgical Industries*, v. 8, Aug. '45, pp. 29-31, 45.

Formation due to oxidation of silicon, increasing stability of cementite. 5 ref.

3-162. Alloy Cast Irons. *Canadian Metals & Metallurgical Industries*, v. 8, Aug. '45, pp. 37-38.

Role of nickel and associated alloys in improving properties.

3-163. Nitrogen in Chromium-Nickel Steels. *Metal Treatment*, v. 12, summer '45, p. 86.

Nitrogen can be used to replace some of the nickel in certain chromium-nickel steels. How this substitution can affect the mechanical and electrical properties of austenitic and austenitic-ferritic chromium-nickel steels is shown. (Translated from *Stahl und Eisen.*)

3-164. High Tensile Steel for Castings. W. West, C. C. Hodgson and H. O. Waring. *Metallurgia*, v. 32, July '45, pp. 126-132.

Number of aspects of steel making and foundry practice investigated; types of steels were of the low and medium alloy varieties capable of giving ultimate tensile strengths from 35 to 65 tons per sq. in. on sections up to 4 in., or as high as 75 tons per sq. in. on smaller sections, accompanied by good ductility and resistance to impact.

3-165. Segregation of Metals and Alloys. *Metallurgia*, v. 32, July '45, pp. 133-134.

Fundamental principles involved in segregation of alloy castings, factors underlying segregation in steel ingots, the relation of open-hearth practice to segregation in rimmed steel, and segregation in babbitt metal.

3-166. Light Alloys for Marine Engines. A. J. Murphy. The American Society of Naval Engineers *Journal*, v. 57, Aug. '45, pp. 399-425.

Characteristics of light alloys which designers will wish to take into account when deciding what role these materials can play in the further development of the marine engine. Pistons; cylinder heads; corrosion; mechanical properties; wrought light alloys; cast light alloys.

3-167. **Metallurgy Reports on the Enemy.** *Aero Digest*, v. 50, Sept. 1, '45, pp. 94, 179-180.
Functional studies; technique not advanced; more work done by hand.

3-168. **Heat and Corrosion Resistant Steels.** R. W. Jones. *Steel Processing*, v. 31, Aug. '45, pp. 489-493.
Required properties for various applications.

3-169. **Tapered-Thickness Bimetal.** William B. Elmer. *Electrical Engineering*, v. 64, Sept. '45, pp. 661T-664T.
Most important properties of thermostatic bimetal strips of uniformly tapered width or thickness or both have been analyzed mathematically, and the findings are described.

3-170. **Carbon Cast Steels—Materials Work Sheet.** *Machine Design*, v. 17, Sept. '45, pp. 153-156.
Properties prescribed in ASTM specifications; characteristics; applications; fabrication; heat treatments; resistance to corrosion; galvanic corrosion; design tips.

3-171. **German Tool and Special Steels.** James P. Gill. *Iron Age*, v. 156, Sept. 13, '45, pp. 54A-54N.
German tool and special steels are described, and analyses of the more popular prewar and war steels are shown.

3-172. **Brittleness and Ductility of Metals at High Temperatures.** W. Siegfried. *Technische Rundschau Sulzer*, 1945, no. 1, pp. 43-79. *Engineers' Digest* (American Edition), Aug. '45, pp. 391-396.
Behavior of a steel under stress at elevated temperature is characterized by two strength values, namely its resistance to deformation and its resistance to fracture. Rapid decrease in the strength of a notched piece may be taken to be due to the same cause responsible for the deformationless failure of notch-free test bars of steel under long-time stress; experiments with tin-cadmium alloys.

3-173. **Improvement of Engineering Carbon Steel.** A. P. Gulyaev and F. M. Halperin. *Stal*, v. 3, 1943, pp. 49-51. *Engineers' Digest* (American Edition), v. 2, Aug. '45, pp. 398-399.
Improvement of engineering carbon steel by the addition of small amounts of boron or of grainal. Several experimental heats were prepared in which deoxidation was carried out with the addition of boron, grainal, and aluminum respectively.

3-174. **The Structure of Hard Metal Alloys.** W. Dawihl and J. Hinuber. *Kolloid Zeitschrift*, v. 104, Aug.-Sept. '43, pp. 233-236. *Engineers' Digest* (American Edition), v. 2, Aug. '45, pp. 407-409.
Characteristics responsible for the outstanding abrasion resistance properties of hard metal alloys of the tungsten carbide type with 60% of a low melting metal (cobalt).

3-175. **The Properties of Some Magnesium-Aluminum-Zinc Casting Alloys and the Incidence of Microporosity.** F. A. Fox. Institute of Metals *Journal*, v. 71, Aug. '45, pp. 415-439.
Static mechanical properties of magnesium-aluminum-zinc alloys containing up to 10% of aluminum and 6% of zinc; a similar range of alloys had also been examined for "inherent" tendencies to microporosity, as demonstrated by radiography of an arbitrary flat-plate test casting. The tensile test results show that optimum ranges of composition exist, which differ with the state of the material examined, i.e., whether cast, solution treated, or fully heat treated. Influence of residual β-phase is harmful to the mechanical properties of imperfectly solution treated alloys, but the presence of precipitate in the fully heat treated alloys tends to offset this adverse effect. 9 ref.

3-176. **Non-Equilibrium Structures in Chill-Cast Tin-Antimony-Cadmium Alloys and Their Effects on Mechanical Properties.** W. T. Pell-Walpole. Institute of Metals *Journal*, v. 71, Aug. '45, pp. 441-454.
Alloys containing metastable suppressed β have high mechanical properties in the as-cast form, but on aging at room temperature or at 100° C. their hardness decreases to values lower than those of the same alloys in stable equilibrium. Alloys with 9 to 14% of antimony and 1½ to 10% of cadmium have much higher mechanical properties in the chill-cast condition, when they contain metastable SbSn, than in stable equilibrium, when SbSn is replaced by CdSb. Chill-cast alloys with 7 to 10% of antimony and ½ to 2% of cadmium temper-harden at 140° C., and, owing to the cored condition of the α solid solution, no grain boundary embrittlement occurs as it does when the same alloys are temper-hardened after a preliminary homogenizing treatment. Rolling inhibits this temper-hardening, which can therefore be applied only to castings. 6 ref.

3-177. **High Carbon Steels.** Harold Shaw. *Iron and Steel*, v. 18, Aug. '45, pp. 403-404.
Choice of plant for providing a suitable atmosphere is not altogether a simple matter of first cost and upkeep. Several factors have to be considered, particularly so in the case of high carbon steels. Figures for relative costs of the two possibilities.

3-178. **Cerium.** G. Ahrens. *Modern Metals*, v. 1, Sept. '45, pp. 20-21.
Cerium, more commonly known as mischmetal, has been experimented and used with both aluminum and magnesium as a minor alloying ingredient in this country, England and Germany, in increasing amounts during this war. Difficulties, such as proper alloying methods and accurate analysis of the cast product, have been overcome, and it is possible that the addition of Cerium will become standard in a variety of light alloys because certain properties have definitely been improved upon in both cast and wrought parts. Properties of mischmetal as well as some of the present day applications. 37 ref.

3-179. **Strain-Age Embrittlement.** W. E. Bardgett. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1389-1397, 1417.
Clear exposition of the nomenclature, coupled with a promising method of detecting embrittlement resulting from the straining and aging of strip material. Wholly concerned with basic open-hearth rimming steel.

3-180. **Germany's Tool and Special Steel Industry.** James P. Gill. *Steel*, v. 117, Sept. 24, '45, pp. 120-126, 128, 130, 132, 134, 136, 139, 140, 143.
Details on methods and analyses reveal strong preference for tungsten types and changing compositions.

4. STRUCTURE
Metallography and Constitution

4-56. **The Liquidus-Solidus Temperatures and Emissivities of Some Commercial Heat Resistant Alloys.** James T. Gow, Anton De S. Brasunas, and Oscar E. Harder. *Metals Technology*, v. 12, Aug. '45, T.P. 1838, 18 pp.
Results obtained and the techniques employed in determining liquidus and solidus temperatures of the HH and HT type heat resistant alloys. The relation of true temperatures (thermocouple) to apparent temperatures (optical pyrometer) for the molten HH and HT type alloys. 6 ref.

4-57. **Effect of Variables on the Recrystallization of Silicon Ferrite in Terms of Rates of Nucleation and Growth.** James K. Stanley. *Metals Technology*, v. 12, Aug. '45, T.P. 1840, 23 pp.
Data presented on the effect of deformation on the recrystallization of 1% silicon ferrite. Effect of temperature was studied at 740, 770, and 800° C. on the isothermal recrystallization curves. Fine-grained material recrystallizes more rapidly than coarse-grained material. Addition of a solid-solution element like silicon to iron decreases the rate of recrystallization. Recovery of cold worked 1% silicon ferrite for 25 hr. at 350° C. results in a very slight increase in the rate of recrystallization. 14 ref.

4-58. **Metallography in Color.** R. P. Loveland. *Metal Industry*, v. 67, Aug. 10, '45, pp. 82-85, 87.
Color effects have long been used by metallographers for the identification of inclusions, segregate phases and diffusion zones; later developments in the application and use of polarized light greatly enlarged the scope of these identification methods. (From A.S.T.M. *Bulletin.*)

4-59. **The Sigma Phase.** Francis B. Foley. *Alloy Casting Bulletin*, No. 5, July '45, pp. 1-9.
An important property of alloys utilized for heat resistant service is the ability of the metal to retain its desirable characteristics throughout the range of probable operating temperatures. Some high alloy ferrous metals are subject to embrittlement at certain elevated temperatures as a result of the formation of a constituent called the "sigma phase." If appreciable amounts of the extremely hard, brittle sigma phase can be formed, an alloy steel may lose ductility to such an extent that its usefulness may be seriously impaired. Although the existence of this phase has been observed for a number of years, the possibility of the occurrence of phases other than the well-known alpha and gamma may sometimes be overlooked in the consideration of alloys suitable for high temperature applications. Nature and occurrence of the sigma phase.

4-60. **Metallography in Color.** R. P. Loveland. *Metal Industry*, v. 67, Aug. 17, '45, pp. 98-100.
The illumination system and the compensation necessary to make up for its shortcomings.

4-61. **Metallography in Color.** R. P. Loveland. *Metal Industry*, v. 67, Aug. 24, '45, pp. 119-120.
Correct exposure, as in all photographic processes, is of paramount importance in color photomicrography. Suggests the best method of obtaining this. Typical photomicrographs reproduced in color illustrate the results that can be obtained when the correct procedure is followed. 12 ref.

4-62. **Some Applications of X-Ray Diffraction.** Stanley Brosky. *Industrial Radiography*, v. 4, summer '45, pp. 42-46.
Powder method of crystal examination; Bragg's law and interplanar spacings.

5. POWDER METALLURGY

5-40. **Notes on Copper-Base Compacts and Certain Compositions Susceptible to Precipitation Hardening.** F. R. Hensel, E. I. Larsen and E. F. Swazy. *Metals Technology*, v. 12, Aug. '45, T.P. 1810, 12 pp.
Copper compacts were studied and a preliminary investigation indicates that excellent physical and electrical properties can be obtained with age hardening compositions containing chromium, cobalt, and beryllium, or nickel and beryllium. The addition of small percentages of phosphorus and titanium hydride is beneficial in such alloys. 3 ref.

5-41. **German Cemented Carbide Industry.** Gregory Comstock. *Iron Age*, v. 156, Aug. 30, '45, pp. 36A-36L.
Description of the wartime controls set up in Germany, the standardization of carbide types for particular applications, production data, information on new production techniques, a report on a new titanium carbide, vanadium carbide, and an investigation of advances in hot pressing practices.

5-42. **Powder Metallurgy.** *Metal Industry*, v. 67, Aug. 31, '45, p. 137.
Production; design limitations; possibilities. 1 ref.

5-43. **Powder Metallurgy.** G. H. S. Price. Electrodepositors' Technical Society *Journal*, (Preprint) v. 20, 1945, pp. 147-153.
Brief, general review of the subject of powder metallurgy with particular reference to the types and properties of the powders used.

6. CORROSION

6-114. **Ferrous Piping Systems in Building.** H. L. Shuldener. *Corrosion & Material Protection*, v. 2, Aug. '45, pp. 6, 8, 10-12.
Suggestions for lengthening the useful life.

6-115. **The Reaction of Copper and Oxygen Saturated Ammonium Hydroxide.** R. W. Lane and H. J. McDonald. *Corrosion & Material Protection*, v. 2, Aug. '45, pp. 17-28.
Corrosion of copper by ammonia in steam power plants using surface waters as their boiler feed water. Knowledge of the mechanism or rate-determining step of the reaction of copper and ammonia should be of considerable value in determining the best method for inhibiting the reaction.

6-116. **Corrosion of Steels in Marine Atmospheres and in Sea Waters.** C. P. Larrabee. *Western Metals*, v. 3, Aug. '45, pp. 18-19.
Sulphur dioxide contaminated atmosphere at industrial locations, especially where the contamination was greatest, caused more corrosion than the sea salt deposited on the specimens at any marine site. At most locations where a succession of samples was exposed, considerable variation was found in the loss of weight during each of the five successive years.

6-117. **The Control of Oxidation on Zinc.** Michael P. Bruno. *Modern Lithography*, v. 13, June '45, pp. 43, 45, 47, 49, 77.
Solution composition; dipping time; draining and washing; drying; color; life of solution; cost; limitation on use; properties of the Cronak coating.

6-118. **The Use of a Tin Undercoat to Improve the Corrosion Resistance of Painted Steel.** Ernest S. Hedges and L. A. Jordan. Iron & Steel Institute, Advance Copy, July '45, 9 pp.
Effectiveness of tin undercoats on painted steel in retarding corrosion has been examined. The investigations covered electrodeposits of tin from both the alkaline and acid tin baths, using thicknesses of 0.000008 and 0.00003 in., and the effect of flash-melting the tin coatings and of oxidizing the tin surface by chemical treatments; in addition, specimens of plain steel, hot-dipped tinplate and phosphated steel were included in the series. Twelve different paints were applied, including linseed-oil paints, nitro-cellulose lacquer, stoving paints, and air-drying japans. Accelerated corrosion tests show that treatment with electrodeposited tin, especially when followed by the application of the T.R.I. (Tin Research Institute) anti-rusting oxide film, adds very greatly to the protection afforded by the paints. The best treatment was 0.00003 in. of tin electrodeposited from the sodium stannate bath and further protected by the T.R.I. film.

6-119. **Ethylcellulose Coatings Protect Metal Parts From Corrosion.** F. L. Gerin. *Corrosion & Material Protection*, v. 2, Aug. '45, pp. 13-15.
Method of packaging military equipment for overseas shipment evolved using compounds of ethylcellulose. Complete protection from damage by corrosion during shipping or from long storage in any climate is provided by this compound.

6-120. **Stress-Corrosion Cracking.** J. W. Donaldson. *Metal Treatment*, v. 12, summer '45, pp. 106-115.
Review of some of the papers on stress-corrosion cracking presented at a joint symposium of the American Society for Testing Materials and the American Institute of Mining and Metallurgical Engineers. 2 ref.

6-121. **Corrosion of Aluminum by Die Materials.** P. A. Haythorne. *Iron Age*, v. 156, Sept. 20, '45, pp. 72-73.
Investigation concerned with the corrosion of Alclad 24S sheet metal parts formed on low-melting alloy dies. Application of a heavy-bodied lubricant to both dies and Alclad sheet goes far in preventing the embedding of corrosive particles.

6-122. **Corrosion Prevention by Controlled Calcium Carbonate Scale.** Sheppard T. Powell, H. E. Bacon, and J. R. Lill. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Sept. '45, pp. 842-846.
Use of controlled calcium carbonate scale for corrosion prevention in cooling tower systems serving steel equipment has been investigated at plants constructed for war production, when copper alloys were scarce. Study revealed factors that markedly affect the success of the treatment, which have hitherto had little recognition. If rising temperatures cause the actual pH of the water to drop at the same rate as the calcium carbonate saturation pH, scale of uniform thickness will be deposited over the entire temperature range. 4 ref.

6-123. **Corrosion of Aluminum.** P. A. Haythorne. *Metal Industry*, v. 67, Sept. 7, '45, pp. 146-147, 149.
Results of an investigation concerned with the corrosion of Alclad 24S sheet metal parts formed on low melting alloy dies. Includes a brief description of corrosive attack, a solution of the problem and recommendations to insure against further occurrence.

7. CLEANING AND FINISHING

7-188. **Automatic Spray Painting.** R. H. Wallace. *Monthly Review*, v. 32, Aug. '45, pp. 781-782, 843.
Application; savings in labor; savings in material; savings in floor space; cleanliness; cost control; products; construction.

7-189. **Production-Line Finishing.** *Steel*, v. 117, Aug. 27, '45, pp. 110, 112.
Methods and fixtures which were used for coating mortar shell cases in quantity suggest ready adaptation to other finishing problems.

7-190. **Short Cycle Anodizing.** *Steel*, v. 117, Aug. 27, '45, pp. 114, 116, 118.
Uses less power and chromic acid, in addition to shortening time for operation to 20 min.

7-191. **Continuous Pickler for Coiled Material.** A. S. Hellstrom. *Iron & Steel Engineer*, v. 22, Aug. '45, pp. 59-61.
New design, developed by Greer Steel Co. and licensed for manufacture. Handles wide and narrow strip, rod, or wire. Experience has shown a fine operating record with good economy.

7-192. **Metals, Finishes, and Finishing Processes.** Edward Engel. *Iron Age*, v. 156, Sept. 6, '45, pp. 70-79.
Physical cleaning procedure; metal preparation equipment; typical preparation procedures; preparation of specific metals; pickling; tumbling, sand blasting.

7-193. **Low-Cost Protective Coatings for Tools and Gages.** J. V. Kielb. *Production & Engineering Bulletin*, v. 4, June '45, pp. 90-92, 94, 96.
Time and costs in protective wrapping of tools and gages are cut by the application of ethylcellulose coatings. Damage to all types of tools in shipment or storage is drastically reduced by this method.

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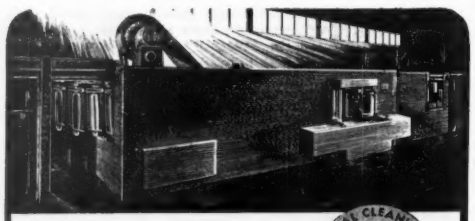

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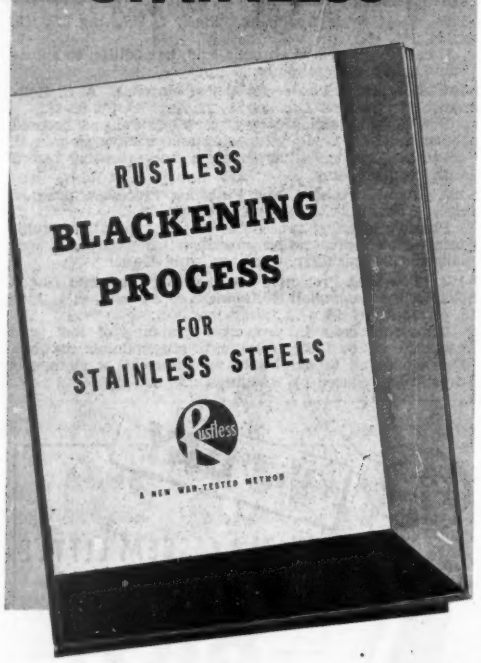

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Metal Literature Review—*Continued*

7. CLEANING & FINISHING (*Cont.*)

7-194. **Coating and Baking Metal Sheets.** Fred S. Bailey. *Modern Lithography*, v. 13, June '45, pp. 27-30, 79.
Materials; types of coaters; applications.

7-195. **Powdered Metal Spray.** P. Caredio and G. Duccini. *Western Machinery & Steel World*, v. 36, Aug. '45, pp. 348-349, 373.
Glaspray gun uses powdered metal, in readily obtained commercial grain sizes, and by absolute control of the torch temperatures, readies the old surface by bringing it to a temperature most receptive to the fusing temperature of the powder, and then applies, within the torch flame, a mass of uniform sized molten particles that present a known thickness of metal with every pass of the gun.

7-196. **Cleaning and Electroplate Finishing of Beryllium Copper Components.** E. E. Halls. *Metal Treatment*, v. 12, summer '45, pp. 71-85.
Corrosion resisting properties of beryllium copper, and processes employed for the removal of machine lubricants, oil and grease at intermediate or final stages of production. Artificial comparative corrosion tests are described and the results tabulated, while details of numerous acid solutions for removing oxide scale are given, together with particulars of sulphuric acid treatment followed by acid dichromate solution. Cleaning specifically for electroplating is dealt with, and the composition of several electrolytes is given.

7-197. **The Chemical Control of the Hot-Dip Galvanizing Process.** F. F. Pollak and E. F. Pellowe. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1349-1355.
Pickling procedure; rinsing and fluxing; drying and galvanizing practice; evaluation of the quality of the coating; examination of pickle solution; examination of flux solution; examination of etching solution; examination of spelter. 11 ref.

7-198. **Pre-Treating Metals for Quality Finish.** Gilbert C. Close. *Industrial Finishing*, v. 21, Aug. '45, pp. 24-28.
Clean surfaces of iron and steel will rust quickly unless they are immediately given a rust-proofing treatment or a protective coating. They can be painted, but if the paint film is scratched to expose the metal, rust can start, and once started, it may spread under the adjoining paint film, causing the film to flake off. But if the metal is given an effective rust-proofing after cleaning and before painting, it need not be painted immediately; then, if the paint film is scratched through, no rusting will occur. If the scratch is deep into the metal, the exposed metal may rust but the rust cannot spread farther because of the rust-proofed surface under the paint film.

7-199. **Electrostatic Spraying of Cartridge Tanks.** Fred M. Burt. *Industrial Finishing*, v. 21, Aug. '45, pp. 64-66, 68.
How cartridge tanks are formed by drawing; washing, rinsing, drying performed automatically; tanks revolve as they travel through spray; spraying in field of static electricity.

7-200. **Electrolytic Polishing.** *Steel*, v. 117, Sept. 10, '45, pp. 104-106.
Summary of the current status of the electro-polishing process shows why some producers of consumer articles may find it a tool for new finishing effects and possible economies.

7-201. **The Electro-Polishing of Metals.** N. A. Tope. *Engineering Materials and International Power Review*, v. 3, April '45, pp. 63-70.
Discusses its merits and potentialities. Development; the preparation of metallurgical microspecimens; commercial processes; miscellaneous metals; future trends. 17 ref.

7-202. **Protection of Iron and Steel.** U. R. Evans. *Metal Industry*, v. 67, Aug. 24, '45, pp. 114-118.
Of the methods available for the protection of iron and steel in the field, the author considers that the use of paints so richly pigmented with zinc as to constitute practically a galvanized coat offers distinct possibilities especially in the prevention of corrosion fatigue. 16 ref.

7-203. **Black Anodizing.** *Metal Industry*, v. 67, Aug. 24, '45, p. 118.
Production of a deep black color on copper and brass.

7-204. **Metals, Finishes, and Finishing Processes, Part II.** Edward Engel. *Iron Age*, v. 156, Sept. 13, '45, pp. 64-71.
Interest is centered in electropolishing, and the selection of surface finishes for functional and decorative purposes.

7-205. **Comments on Metal Cleaning.** Albert J. Pfetzing. *Industrial Gas*, v. 24, Aug. '45, pp. 11-14, 27-30.
Purpose of discussion is to create a more active interest in the planning and installation of metal cleaning equipment and to present practical information and ideas gathered mainly from both users and producers of cleaning equipment, and also the literature. Alkaline and solvent cleaning.

7-206. **Infra-Red Versus Convection Heating.** Charles C. Eeles. *Industrial Gas*, v. 24, Aug. '45, pp. 15-18, 32-36.
Determines the relative merit and future possibilities of so-called "convection" and "infra-red" equipment for curing industrial finishes. Time-temperature curing curve; curing time for single unit equalized; controlling results in infra-red ovens; formula for oven temperatures given; convection oven heats more uniformly.

7-207. **Chemical Processing Prior to Plating and Anodizing.** Carl Hirdler. *Metal Finishing*, v. 43, Sept. '45, pp. 368-370.
Key to successful cleaning is the selection of a cleaning method specialized for the kind of work which is being cleaned, the kind of dirt to be removed, the characteristics of the metal being treated, and the degree of cleanliness required.

7-208. **Metals, Finishes, and Finishing Processes.** Edward Engel. *Iron Age*, v. 156, Sept. 20, '45, pp. 74-83.
Data correlated to aid in the selection of the proper metal, finish, and finishing process. Data given on proprietary plating baths, surface treatment of aluminum and magnesium alloys, etching procedures, dye coloring.

7-209. **The Chromate Passivation of Zinc.** S. G. Clarke and J. P. Andrew. Electrodepositors' Technical Society *Journal*, (Preprint), v. 20, 1945, pp. 119-138.
Results are presented of experiments on chromate films on zinc, produced by dipping in sodium dichromate solutions of the type used in the Cronak process and variations thereon. The work covered the effect of solution composition, time of immersion, etc., on the films produced and their characteristics, in particular the protective value under humid corrosion conditions. 5 ref.

7-210. **Anti-Corrosive Painting of Metals.** H. W. Rudd. *Paint Manufacture*, v. 15, July '45, pp. 183-188.
Basic principles of corrosion as applied to the metal surfaces underneath paint films. Some of the physical and mechanical processes which still result in the failure of too many paint systems designed to protect structural metals, and to indicate some of the essentials for success.

7-211. **Finishing Procedures at I.B.M.** *Die Casting*, v. 3, Sept. '45, pp. 68, 70-72.
Procedures standardized wherever possible so that the same coatings and equipment can be used for both die cast and sheet metal parts. This not only is an important cost saving feature but also results in a high over-all production rate.

7-212. **Anodizing of Aluminum Alloys.** Raymond J. Kwasnik. *Die Casting*, v. 3, Sept. '45, pp. 74-76, 78.
Anodic films may be produced by three separate methods; the thickness of physical properties of the film is dependent upon type of current, voltage, nature and concentration of anodizing reagents, temperature of solution, and the time interval of treatment.

7-213. **Cleaning, Painting, Drying Setup for New Metal Products.** Byron Morrill. *Industrial Finishing*, v. 21, Sept. '45, pp. 34-36, 79-80.
Engineering plans for a new conveyorized cleaning-painting-drying setup on a variety of products can be profitably patterned along the lines of the one illustrated for protectively coating rockets.

7-214. **Infra-Red vs. Convection Ovens for Drying Paint Coatings.** J. F. Gschwind. *Industrial Finishing*, v. 21, Sept. '45, pp. 46, 48, 50, 52, 54, 56, 58, 60.
Points out and compares some of the factors which must be considered when deciding the best heating means for an oven in which to quickly dry paint coatings at baking temperatures.

7-215. **Finishing Chairs on a Production Basis.** H. W. Chester. *Industrial Finishing*, v. 21, Sept. '45, pp. 64, 68, 70, 72, 74.
Chairs can be and are being entirely finished on overhead conveyor systems. Many chair factory finishing departments are fully conveyorized, with the result that production is increased and costs reduced.

7-216. **The Passivation of Zinc Using Dichromate Base Solutions, with Special Reference to Electro-Zinc Deposits.** E. E. Halls. *Metallurgia*, v. 32, July '45, pp. 99-104.
Passivation and chromatizing treatments of zinc surfaces have been developed to increase the service obtainable and thereby provide the maximum efficiency with the minimum of raw material. Gives the results of experimental investigations.

7-217. **The Finishing of Light Alloys. Part VII.** H. Silman. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1398-1402, 1417.
Sealing by impregnation; oxalic acid process; aluminum reflectors; immersion treatments; M.B.V. process; Pylumin process; painting on aluminum; electroplating on aluminum; nickel plating; protection of magnesium; half-hour chromizing process; anodic treatment; chrome pickle; stripping; painting. 5 ref.

7-218. **Effect of Polishing Steel.** *Steel*, v. 117, Sept. 17, '45, pp. 143, 146, 188, 190.
Results of studies to determine whether surface finish of a steel affects protective value of plated coating are timely and of interest to all fabricators of steel products requiring a protective or "bright" plate. 7 ref.

8. ELECTROPLATING

8-107. **Some Factors in the Production of Electrolytic Tin Plate.** T. G. Timby. *Iron & Steel Engineer*, v. 22, Aug. '45, pp. 40-48.
Every step in the manufacture of plate and its subsequent coating influences the final product. Progress depends on investigation of the various phases and interchange of information.

8-108. **Tin Fusion by Radiant Tube Heating.** Howard L. Halstead. *Iron & Steel Engineer*, v. 22, Aug. '45, pp. 49-50.
Fusion of electrolytic tin plate by radiant tube heating gives a low fuel cost for the process, with quality comparable to that produced by other methods.

8-109. **Progress Report Number Two: A.E.S. Research Project Number 2 on Analysis of Impurities in Plating Baths.** G. Frederic Smith and Frederick Duke. *Monthly Review*, v. 32, Aug. '45, pp. 805-807, 810.
Aluminum; cadmium; calcium; chromic acid; copper; iron; lead; manganese; silica; zinc. 25 ref.

8-110. **Standby D. C. Battery System for Silver Plating.** D. L. Patrick. *Monthly Review*, v. 32, Aug. '45, pp. 793-794, 810.
To insure against current interruptions, a standby d. c. battery system devised that can be installed in conjunction with silver plating equipment and electrical circuits. Installation; operation; equipment and cost.

8-111. **Peacetime Plating.** R. MacNair. *Metal Industry*, v. 67, Aug. 17, '45, pp. 106-108.
Plant and equipment for bright nickel and chromium.

8-112. **Electronic Devices.** A. Korbelak. *Metal Industry*, v. 67, Aug. 31, '45, pp. 138-139.
Unusually large variety of metals and non-metals used in the manufacture of electronic devices has resulted in requests for the increased use of electrochemical methods in the processing of such materials. (The Electrochemical Society.) 9 ref.

8-113. **Peacetime Plating.** R. MacNair. *Metal Industry*, v. 67, Aug. 31, '45, pp. 139-140.
Plant and equipment for bright nickel and chromium.

8-114. **Is The Salt Fog a Test For a "Poor" Nickel Plate?** George B. Hogaboom. *Metal Finishing*, v. 43, Sept. '45, pp. 372-373.
Real value of the nickel deposit as a protective coating can be determined only by testing the nickel deposit itself in manner given.

8-115. **New Chrome Plating Method Boosts Life of Engine Parts.** D. P. Thornton. *National Petroleum News*, v. 37, Sept. 5, '45, pp. R-684-R-686, R-688.
"Porus-Krome" process produces surface filled with pockets and channels which retain lubricant and overcome chromium's usual lack of wettability. 7 ref.

8-116. **Quality Nickel Deposits Maintained by Continuous Solution Purification.** Bernard C. Case. *Monthly Review*, v. 32, Aug. '45, pp. 788-790.
Cobalt-nickel baths with details of recommended practices worked out. Purification in the make-up of new solutions. 4 ref.

8-117. Etching Steel With Oxalic Acid Before Industrial Chromium Plating. G. R. Makepeace. *Metal Finishing*, v. 43, Sept. '45, pp. 364-367.

New pre-treatment for "hard" chromium plating shows important advantages. Etching methods; requirements; oxalic acid etching; effect of variables; performance; advantages of oxalic acid.

8-118. Chlornaphthalene Wax for Stopping-Off in Electrodeposition Practice—Its Advantages and Limitations. C. W. Richards. Electrodepositors' Technical Society *Journal*, (Preprint), v. 20, '45, pp. 155-164.

Ideal stopping-off agent is one with good dielectric properties, satisfactory adhesion to the articles to be treated, resistance to all plating and cleaning solutions, ease of application and removal, capable of use at elevated temperatures, recoverable for re-use, non-inflammable and non-toxic. Type of material to be considered falls into the wax class.

9. PHYSICAL AND MECHANICAL TESTING

9-107. Cast-to-Size Impact Specimens for Aluminum Sand Casting Alloys. R. A. Quadt. American Society for Testing Materials *Bulletin*, no. 135, Aug. '45, pp. 24-26.

Results indicate that it is possible to produce quickly and cheaply cast-to-size Charpy impact specimens which satisfy the criteria outlined. Both notched and unnotched test specimens may be obtained from a single sand casting. It is thus possible to obtain data on two sometimes unrelated properties of an alloy—its impact resistance and its sensitivity to notching.

9-108. Compression Testing of Magnesium Alloy Sheet. A. A. Moore and J. C. McDonald. American Society for Testing Materials *Bulletin*, no. 135, Aug. '45, pp. 27-30.

Methods of compression testing of magnesium alloy sheet including a rapid means of obtaining an autographic stress-strain curve. This method, which should be satisfactory for other metals, combines an adaptation of the Baldwin-Southwark Model PSH-8 extensometer with a Montgomery-Templin type jig. Results of tests made by various methods, including "pack" and single-sheet, are given for magnesium alloys in thicknesses from 0.016 in. to 0.250 in. The use of a reduced-section specimen is recommended. 5 ref.

9-109. Yield Stress and the Criteria of Yielding, Part V. L. R. Underwood. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1360-1366.

Theories of strength; derivation of the Hencky-Mises condition of plasticity; constrained yield stress-derivation of the criterion $S_1 - S_3 = 1.15S_0$ commonly used in theories of rolling; condition of plasticity expressed in terms of normal stresses and a shear stress; criterion for plastic yielding when spread is not negligible; factors affecting the yield stress; distinction between hot and cold rolling; homologous temperatures; experimental determination of yield stress.

9-110. Fatigue Strength of 5¼-In. Diameter Shafts as Related to Design of Large Parts. O. J. Horger, T. V. Buckwalter and H. R. Neifert. *Journal of Applied Mechanics*, v. 12, Sept. '45, pp. A149-A155.

Reports the results of rotating cantilever bending fatigue tests made on shafts having different size fillets connecting a 5¼-in. diameter portion to a 6$\frac{9}{16}$-in. section. Shafts were machined from normalized and tempered forgings of plain carbon steel of 0.52% C (S.A.E. 1050). Endurance limit for the $\frac{3}{4}$-in. polished fillet was found to be 25,500 psi., as compared with 18,500 psi. for the $\frac{3}{32}$-in. fillet. Rolling the $\frac{3}{32}$-in. radius increased this value to 24,000 psi. or an increase of 30% over the not-rolled fillet.

9-111. Cumulative Damage in Fatigue. Milton A. Miner. *Journal of Applied Mechanics*, v. 12, Sept. '45, pp. A159-A164.

Phenomenon of cumulative damage under repeated loads was assumed to be related to the net work absorbed by a specimen. The number of loading cycles applied expressed as a percentage of the number to failure at a given stress level would be the proportion of useful life expended. When the total damage, as defined by this concept, reached 100%, the fatigue specimen should fail. Experimental verification of this concept for an aluminum alloy, using different types of specimens, various stress ratios, and various combinations of loading cycles, is presented. These data are also analyzed to provide information on different stress ratios when an S-N curve for any one ratio is known. Results of a sample analysis based on experiments are given. It is concluded that a simple and conservative analysis is possible using the concept of cumulative fatigue damage.

9-112. Interchangeability. C. A. Gladman. *Automobile Engineer*, v. 35, Aug. '45, pp. 329-334.

Basic principles underlying the application of tolerances.

9-113. Notched-Bar Impact Test. John H. Hollomon. *Iron and Steel*, v. 18, Aug. '45, pp. 387-394.

Significance and interpretation of results.

10. ANALYSIS

10-70. A Rapid Method for Determination of Silica in Iron Ore and a Spectrophotometric Method for Phosphorus. Charles C. Hawes. *Metals Technology*, v. 12, Aug. '45, T.P. 1794, 10 pp.

Demonstrates that the methods described for determining silica and phosphorus are satisfactory and that the results obtained agree favorably with standard methods.

10-71. Rapid Colorimetric Analysis. *Steel*, v. 117, Aug. 27, '45, pp. 130, 156-157.

Improved analytical methods for determination of aluminum and silicon in iron and steel. Attains higher accuracy through improved methods. 2 ref.

10-72. Application of Colorimetry to the Analysis of Corrosion Resistant Steels. Lewis G. Bricker and Kenneth L. Proctor. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Aug. '45, pp. 511-512.

Procedure for the determination of small amounts of lead in corrosion resistant steels. Method is rapid and the precision is greater than in any other procedure investigated. Lead is removed from the bulk of interfering elements by utilizing a seeding out procedure, employing ammonium hydroxide and hydrogen sulphide, and is finally isolated by selective extraction with a chloroform solution of dithizone. Final estimation may be made both visually and by photoelectric colorimeter. 10 ref.

10-73. A Method for the Determination of Alumina in Anodic Baths and Other Solutions Containing Hexavalent Chromium. Winslow H. Hartford. *Aluminium & The Non-Ferrous Review*, v. 10, April-June '45, pp. 33-34.

Method developed for the routine determination of alumina in the presence of chromic acid and which is especially suitable for the analysis of anodic baths. When substantial quantities of alumina are present, an accuracy of 1% may be expected, but with small quantities of alumina, the method is somewhat less accurate. Moderate quantities of copper and trivalent chromium do not interfere, but iron is harmful. Method appears to be more accurate than other rapid methods for the determination of alumina, and does not require the use of any special equipment. 9 ref.

10-74. Polarographic Determination of Lead in Brasses and Bronzes. G. W. C. Milner. *Analyst*, v. 70, July '45, pp. 250-253.

Lead figures given in the tables represent the results by several workers and show the reproducibility of the polarographic determination. An agreement within ±0.01% with figures obtained by standard chemical methods was achieved for the brasses and bronzes containing a low percentage of lead, whilst agreement within ±0.03% was achieved for those with lead contents up to 4%. For bearing metals containing amounts of lead ranging from 20 to 28% agreement within ±0.15% can be attained provided that there is no doubt about the homogeneity of the original samples. By this method a single determination can be carried through in 20 min., showing considerable saving in time as compared with the chemical method with an equivalent accuracy. 5 ref.

10-75. The Photometric Determination of Lead in Brass. R. E. Oughtred. *Analyst*, v. 70, July '45, pp. 253-254.

Procedure has been devised whereby minute quantities of lead in brass may be accurately determined. It involves virtually complete precipitation of the tin as metastannic acid; precipitation of the lead as chromate from the filtrate, as in the method of Fisk and Pollak; solution of the lead chromate in nitrate acid and absorptiometric determination of the lead. 2 ref.

10-76. Rapid Spot Test for Nickel in Steel. E. R. Vance and H. S. Gonser. *Iron Age*, v. 156, Sept. 13, '45, p. 540.

Spot test method for nickel in which the intensity of the spot of red is proportional to the percentage of nickel present in the sample under test. Gives material required and procedure.

10-77. Spectrographic Analysis of the Zinc Base Die Casting Alloys. Robert Raisig. *Die Casting*, v. 3, Sept. '45, pp. 36-37, 39-40.

Presents the equipment and method used in the routine analysis of zinc base die casting alloys.

10-78. Application of Micro Combustion Technique to Metallurgical Analysis. G. Ingram. *Metallurgia*, v. 32, July '45, pp. 137-140.

Problems associated with the application of micro combustion technique to the determination of carbon in steels discussed. By elimination of the main sources of error it is possible to obtain results comparable with those obtained using standard procedures. The apparatus necessary is quite simple.

11. LABORATORY APPARATUS, INSTRUMENTS

11-67. A Rapid Laboratory Method for Estimating the Basicity of Open-Hearth Slags. W. O. Philbrook, A. H. Jolly and T. R. Henry. *Metals Technology*, v. 12, Aug. '45, T.P. 1862, 11 pp.

Laboratory technique by which the basicity of basic open-hearth furnace slags could be estimated with sufficient accuracy. Process consisted of measuring the slight basicity of an extract of the powdered slag in water. 3 ref.

11-68. A New Coating Thickness Gage. S. Lipson. American Society for Testing Materials *Bulletin*, no. 135, Aug. '45, pp. 20-23.

New coating thickness gage described, which employs the electromagnetic principle for determining the thickness of non-magnetic coatings on steel. Principle of operation is given.

11-69. German Measuring Instruments Reflect High Degree of Precision. *American Machinist*, v. 89, Aug. 30, '45, pp. 99-102.

Collection of devices in the hands of the Navy Department shows close control of quality in enemy metalworking plants.

11-70. Electronic Gage for Blind Operators. *Steel*, v. 117, Sept. 3, '45, pp. 128, 180.

Permits precision checking the outside diameter of bearing races to within a twenty-five millionth of an inch.

11-71. A Photoelectric Exposure Meter for Metallography. A. J. Brunner. *Metals & Alloys*, v. 22, Aug. '45, pp. 416-417.

Construction and calibration of a useful device for rapidly estimating photographic exposures in metallographic testing and inspection.

11-72. The Supersonic Reflectoscope for Interior Inspection. Floyd A. Firestone. *Metal Progress*, v. 48, Sept. '45, pp. 505-512.

Instrument for the measurement or the non-destructive testing of solid parts for flaws by sending supersonic sound waves into the part and observing reflections from the boundaries of the part or from any flaws within it.

11-73. The Supersonic Flaw Detector. Eric N. Simons. *Metal Progress*, v. 48, Sept. '45, pp. 513-516.

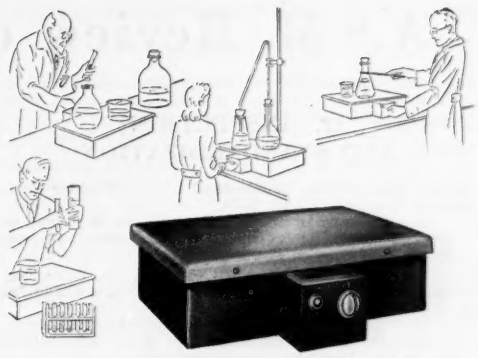
By means of supersonic detection, metallic and other parts may be tested non-destructively. It employs the device of sending out a train of supersonic waves so short that the wave length is very much less than the distance between the boundaries of the medium being investigated. The transmitted and reflected wave-trains are shown on a cathode-ray tube (screen of an oscilloscope) in such a way that they do not interfere, and it is possible to detect an extremely small echo, even though it may be followed by other echoing reflections containing hundreds of thousands of times as much energy.

11-74. Electronic Sound Gaging Device Developed by Timken. *Modern Machine Shop*, v. 18, Sept. '45, pp. 180, 182, 184.

Makes possible employment of blind operators on inspection of parts.

11-75. An Adjustable-Range Force-Measuring Spring. *Iron Age*, v. 156, Sept. 20, '45, p. 63.

New type force-measuring beam provides comparable deflections under such widely divergent load ranges as 0 to 4000 lb., 0 to 20,000 lb., and the maximum, 0 to 100,000 lb. This new measuring beam has a stiffness which can be varied in accordance with the desired load range when applied to an automatic creep testing machine.



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A.S.M. Review of Current Metal Literature — *Continued*

12. INSPECTION AND STANDARDIZATION

12-182. **Special Tools Standardized.** *Screw Machine Engineering*, v. 6, Aug. '45, pp. 76-78.

Some of the major advantages which can be secured by users of carbide tools, when "standard items" are employed.

12-183. **Quality Control, Part III.** A. Hone and E. Pearson. *Canadian Metals and Metallurgical Industries*, v. 8, Aug. '45, pp. 24-28, 45.

Metallography. Control during casting; constituents; constituent distribution; grain size; grain flow; control during heat treatment; anodic coatings.

12-184. **Reducing Defective Material and Inspection Time by Statistical Quality Control.** *Canadian Metals & Metallurgical Industries*, v. 8, Aug. '45, pp. 33-36.

Use graphic methods to picture what is going on in a process. Let everybody in the plant know what is going on. Determine the significance of operation test results by statistical methods. When it is necessary to reduce undesirable deviations in quality, consider library research, laboratory research, planned experiments, and process correlation. Determine the amount of inspection necessary, using scientific methods. Cost data in graphic form.

12-185. **Metallography a Light Metal Inspection Tool.** *Light Metal Age*, v. 3, Aug. '45, pp. 17-19.

Advantages offered by metallographic inspection as a control of die casting quality summarized. Qualifications of a metallographer, metallographic techniques, the equipment necessary for installation of a metallographic laboratory, and concrete applications of this type of inspection are considered.

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12-186. **High-Speed X-Rays.** Charles M. Slack, C. T. Zavales, and Edward R. Thilo. *Steel*, v. 117, Sept. 3, '45, pp. 114-117, 150, 152, 155-156, 158, 160, 162.

Field emission arc cathode eliminates need for long exposures, making X-rays useful for investigation of mechanical and metallurgical phenomena. Presents history of tube and circuit development, and description of equipment.

12-187. **Trepanning Welded Joints for Defects.** J. B. Arthur and M. H. MacKusick. *Iron Age*, v. 156, Sept. 6, '45, pp. 80-82.

Although a destructive type test and covering small areas, trepanning is a valuable welding inspection tool for revealing certain critical defects not detectable by other methods. The combination of trepanning and X-ray appears to be the ideal inspection procedure. Interpretation of photographs of plugs removed from welds by trepanning can readily be done by welders of average skill.

12-188. **Quality Control, Part III.** A. Hone and E. Pearson. *Canadian Metals & Metallurgical Industries*, v. 8, Aug. '45, pp. 24-28, 45.

Extreme care should be exercised to ensure that the structure is in no way altered from the original state through deformation by shearing or bending or overheating by sawing or machining. Care must be taken in all the stages of polishing to prevent flow which will obscure the true structure of the metal. Control during casting; constituents; constituent distribution; grain size; grain flow; control during heat treatment; anodic coatings.

12-189. **New Management Method for Industrial Processes.** H. H. Fairfield. *Canadian Metals & Metallurgical Industries*, v. 8, Aug. '45, pp. 32-36.

Reducing defective material and inspection time by statistical quality control.

12-190. **Something New in Remote Control for the Steel Industry.** Theodore J. Kauffeld. *Sheet Metal Industries*, v. 22, Aug '45, pp. 1356-1359, 1366.

Desires to stimulate engineering thought in the steel industry as to the practical application of this most versatile, accurate and relatively inexpensive piece of equipment which, although combat tested, is now making its debut in many other industrial applications such as in the fields of industrial equipment, electronic devices, marine apparatus, aircraft control.

12-191. **Relationship of X-Ray Inspection to Light Metals Foundry Control.** Robert Taylor. *Aluminum & Magnesium*, v. 1, Aug. '45, pp. 20-24.

Acceptance standards; radiographic interpretation; value of X-ray control; defects—their causes and their appearance in the radiograph; X-ray technique. 4 ref.

12-192. **Automatic Film Processing at Willow Run.** Merle F. Valade. *Industrial Radiography*, v. 4, summer '45, pp. 13-17.

Description of process. (Paper for American Industrial Radium and X-Ray Society.)

12-193. **Technique and Terminology Highlights.** Maynard B. Evans. *Industrial Radiography*, v. 4, summer '45, pp. 18-25.

Remarks directed toward the light alloy casting fields of industry; radiographic technique; the X-ray exposure; kilovoltage; milliamperage; time; distance; contrast; latitude; sensitivity; detail; distortion; density; objectionable factors; filtration; screens; film; darkroom processing; developing.

12-194. **A Simple Method for Producing Duplicate Radiographs.** Stuart D. Herbein and James F. McKenna, Jr. *Industrial Radiography*, v. 4, summer '45, p. 28.

Original negative is reproduced on a special type film by a single contact printing exposure. Known as the light reversal process, it is based on massive over-exposure of a special type film.

12-195. **X-Ray Micrography as a Tool for Foundry Control.** Leslie W. Ball. *Industrial Radiography*, v. 4, summer '45, pp. 29-36; also *Metal Industry*, v. 67, Aug. 24, '45, pp. 130-134.

Briefly traces the use of X-ray micrography and shows that with the proper equipment and technique procedure can be simplified. Shows the microcavities can be studied in sufficient detail to enable their proper diagnosis and correction; also shows that an identification library of radiographs together with corresponding micrographs can be provided to assist X-ray interpreters in making decisions regarding castings.

12-196. **Principles of Protection in Industrial Radiography.** Roy M. Seideman. *Industrial Radiography*, v. 4, summer '45, pp. 37-41.

Principles involved in the use of Roentgen rays and gamma rays are based on the penetrating and resolving powers of these rays; biologic effects; medical aspects; tolerance; protection.

12-197. **High-Speed X-Rays.** Charles M. Slack, C. T. Zavales and Edward R. Thilo. *Steel*, v. 117, Sept. 10, '45, pp. 120, 122.

Field emission X-ray technique used to study action of projectiles at Frankford Arsenal may provide means to radiograph valve components in operation and other industrial subjects. It is readily adapted to the taking of high speed "flash" photographs.

12-198. **Statistical Methods in Quality Control. Part IV. Subgrouping of Data—Finding Causes of Trouble.** *Electrical Engineering*, v. 64, Sept. '45, pp. 328-329.

Analysis of raw materials, machines, and men as the three basic causes of variations in processing, and a recommendation for subgrouping of inspection and test data.

12-199. **Gages for Quality Control.** Robert M. Hays. *Western Machinery & Steel World*, v. 36, Aug. '45, pp. 350-351.

Thread plug gages.

12-200. **Lot-by-Lot Inspection for Quality Control.** A. L. Atherton. *Tool & Die Journal*, v. 11, Sept. '45, pp. 122-125.

Advantages and opportunities summarized.

12-201. **Applications of Metallographic Techniques to Engineering Design and Quality Control.** P. Leckie-Ewing. *Western Miner*, v. 18, Sept. '45, pp. 49-52.

Metallography is the study of the internal structure of metals. Many of the techniques have a direct and simple application to the selection and evaluation of metallic materials and to the quality control of metallic products. Fracture testing; hardness testing; macro-examination; micro-examination; torsion failure of steel bar; fatigue failure of coal picks; fatigue failure of generator drive shaft; defective sprayed metal coating; low elongation of steel castings; poor machinability of free-machining bolt stock; development of induction heat treatments; examination of bronze bushings.

12-202. **Gage Control.** W. F. Johnson. *Iron Age*, v. 156, Sept. 20, '45, pp. 68-71.

Gages can never be more precise than the system by which their accuracy is controlled. Selection, maintenance, care and control of gages and tools becomes of importance in any production of quality program. System of gage and tool control described.

12-203. **Talks About Steelmaking Shaping Specifications.** *British Steelmaker*, v. 11, Sept. '45, pp. 400-408.

Tensile strength; elongation; reduction of area; tensile strength and Izod; tempers; chemical analysis; 1920 report; standard specifications.

12-204. **Statistical Method Lowers Inspection Costs.** Garth B. Harris. *Die Casting*, v. 3, Sept. '45, pp. 63-64, 66.

Statistical method ideally suited to manufacturers using die castings because of the large quantities usually involved. Method not only simplifies inspection operations but increases output with lower costs.

12-205. **Gages and Inspection Systems.** Anders Jansson. *Tool Engineer*, v. 15, Sept. '45, pp. 36-44.

Intended to introduce typical systems to readers, without bias or favor; descriptions, while necessarily brief, present the essential principles of the devices shown.

12-206. **Gray Cast Iron.** T. E. Barlow and C. H. Lorig. *American Foundryman*, v. 8, Sept. '45, pp. 57-63.

Tensile strength, as one measure of gray cast iron quality, and Brinell hardness and chemical composition as alternate specifications for gray iron engineering applications, do not necessarily result in irons produced under various conditions being of the same quality and possessing the same properties. The need for a simple method of correlating and interpreting these properties of gray cast iron to permit of more accurate applications is apparent. 1 ref.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-30. **An Electrical Analogue of the Flow of Heat in a Regenerator System.** K. Heindlhofer and B. M. Larsen. *Metals Technology*, v. 12, Aug. '45, T.P. 1798, 19 pp.

Simple electrical apparatus that, through the close analogy between the flow of heat and of electricity, enables one to solve quickly and with satisfactory accuracy many complex problems in heat flow. 5 ref.

13-31. **Furnace Temperature Control.** *Automobile Engineer*, v. 35, Aug. '45, p. 336.

Recent development giving extremely sensitive operation.

13-32. **Open-Hearth Furnace Controls.** V. Gregor. *Industrial Heating*, v. 12, Sept. '45, p. 1534.

Use of both manual and automatic control apparatus on open-hearth furnaces is discussed.

14. FOUNDRY PRACTICE AND APPLIANCES

14-257. **Precision Founding.** Francis Dittmar. *Iron Age*, v. 156, Aug. 23, '45, pp. 74-81.

Use of nitrogen gas for refining molten metal in order to increase its fluidity during the casting step. Three types of centrifugal casting are analyzed and the mold design suitable for each is discussed.

14-258. **Pearlitic Rim in Malleable Iron.** J. E. Rehder. *Canadian Metals and Metallurgical Industries*, v. 8, Aug. '45, pp. 29-31, 45.

Formation due to oxidation of silicon, increasing stability of cementite. 5 ref.

14-259. **The Future of the Light Alloy Foundry Industry.** W. C. Devereux. *Engineering*, v. 160, July 27, '45, pp. 77-80.

Illustrates, by way of example, the manner in which mechanization has been employed to achieve very high outputs despite the severe shortage of skilled foundry workers.

14-260. **Gadgets and Methods of Supporting Cores Useful to the Jobbing Molder.** H. Holdsworth. *Foundry Trade Journal*, v. 76, July 26, '45, pp. 261-263.

Low cost of parts which are, at least in overseas foundries, general foundry stock or can be made by the molder in a few minutes.

14-261. **Porosity and Shrinkage in Non-Ferrous Castings.** *Iron Age*, v. 156, Aug. 30, '45, pp. 36L-36N.

Most obstinate sources of defects in castings are the volume changes in metals, especially the shrinkage occurring during solidification, and the absorption and liberation of gases from metals. Five principal factors are involved in the formation of shrinkage defects.

14-262. **Spinning of Copper-Base Alloys.** W. P. Gobeille and W. J. Hufschmidt. *Iron Age*, v. 156, Aug. 30, '45, pp. 42-46.

Attention is directed to the spun-cast method for other than straight-wall castings, particularly for aluminum, manganese, tin, lead, and nickel bronzes. A number of the products shown, made by true centrifugal, semi-centrifugal, and centrifuging methods, have been achieved only within recent months.

14-263. **Die Casting Close-Fit Threads.** R. E. McIntosh. *Iron Age*, v. 156, Aug. 30, '45, pp. 50-53, 96.

Close-fit threads are secured without tapping or chasing, by die casting in zinc alloy. There is no parting in the axial plane; hence there is no flash on the thread itself.

14-264. **The Modern High Pressure Die Casting Machine.** James L. Erickson. *Light Metal Age*, v. 3, Aug. '45, pp. 12-14, 31.

Critical examination of the modern cold chamber die casting machine in the light of the physical metallurgy involved in the production of pressure die castings. Underlying principles of the modern die casting machine are discussed and desirable mechanical features are considered and summarized.

14-265. **Silico-Fluorides and Compounded Inhibitors in Magnesium Casting.** W. Wade Moss. *Light Metal Age*, v. 3, Aug. '45, pp. 21-28, 31-32, 49.

Components involved in the production of sound magnesium castings.

14-266. **The Future of the Light Alloy Foundry Industry.** W. C. Devereux. *Aircraft Production*, v. 7, Aug. '45, pp. 401-406.

Survey of its present condition and future needs.

14. FOUNDRY PRACTICE (*Cont.*)

14-267. New Malleable Foundry Is Modern. *Foundry*, v. 73, Sept. '45, pp. 84-88, 226, 228.

Many plants erected rapidly; raw materials stored under cover; castings are inspected; equipped with safety devices.

14-268. Molding Large Cast Iron Crankshafts. George Johnstone. *Foundry*, v. 73, Sept. '45, pp. 89, 232, 234.

Three recognized methods of casting large crankshafts include: (1) Vertical pouring and cooling; (2) horizontal pouring and vertical cooling; (3) horizontal pouring and horizontal cooling. Advantages and disadvantages of each method.

14-269. Housekeeping—Essential in Accident Prevention. Ralph R. Meigs. *Foundry*, v. 73, Sept. '45, pp. 90-91, 254-257.

More than storage space needed; good housekeeping principles; avoid defective equipment; maintain clean floors; housekeeping is continuous.

14-270. Foundry Research at American Brake Shoe Co. William G. Gude. *Foundry*, v. 73, Sept. '45, pp. 94-97, 196, 198.

What one large producer of castings is doing to improve foundry practices and develop new products is described.

14-271. Reclaiming Core Sand. James O. Sinkinson. *Foundry*, v. 73, Sept. '45, pp. 104-106, 222, 224.

Process will be of particular benefit to those foundries which do not have convenient railroad sidings, or are faced with the always difficult problem of disposing of used sand. Description of process.

14-272. Mechanization of Iron and Steel Foundries. J. W. Gardom. *Foundry*, v. 73, Sept. '45, pp. 98-101.

Wartime developments in the British foundry industry.

14-273. Eliminating Troubles in Casting Bronze and Aluminum. Anthony Cristello. *Foundry*, v. 73, Sept. '45, pp. 110-111, 162, 164, 166, 168, 170, 172, 174, 178.

Factors to be watched in overcoming some of the principal problems encountered in bronze and aluminum founding.

14-274. Thermit Casting Technique. R. T. Brown. *Steel*, v. 117, Sept. 3, '45, pp. 134, 137, 188, 190.

Produces high grade steel castings; of any size, in limited quantities, with improvised equipment.

14-275. Future of the Light Alloy Foundry Industry. *Light Metals*, v. 8, Aug. '45, pp. 376-377.

War years, which have seen grow to maturity the aluminum and magnesium foundry industry in this country, have left as a legacy many severe economic problems which must be resolved at an early date. Nature of these problems and means of approach to their solution.

14-276. Graphite Molds for Short-Run Castings. John Putchinski. *Iron Age*, v. 156, Sept. 6, '45, pp. 83-85, 170, 172, 174.

In view of the better controls being introduced and more complicated shapes being cast centrifugally, the use of graphite molds shows considerable promise. Graphite inserts may eliminate machining operations such as hole boring, and undercuts and irregular contours will eventually be cast rather than machined.

14-277. Initial Experience in Hydraulic Cleaning in a Steel Foundry Fettling Shop. F. N. Lloyd. *Foundry Trade Journal*, v. 76, Aug. 9, '45, pp. 297-303.

Hydro-Blast process, employing a stream of water and sand at a pressure of 1200 lb., deals with the initial experiences of operating the process.

14-278. Symposium on Continuous Casting. *Metal Treatment*, v. 12, summer '45, pp. 128-129.

Fundamentals of the process; Goss process; direct rolling of strip: the Soro process; Williams process.

14-279. Future of the Light Alloy Foundry Industry. W. C. Devereux. *Metal Treatment*, v. 12, summer '45, pp. 130-133, 136.

Growth and achievements of light alloy foundries during the war. Abridged. (Institute of British Foundrymen.)

14-280. Initial Experience in Hydraulic Cleaning in a Steel Foundry Fettling Shop. F. N. Lloyd. *Foundry Trade Journal*, v. 76, Aug. 16, '45, pp. 319-324.

Operation of plant; sand reclamation.

14-281. An Investigation of the Constitution of Certain Foundry Bonding Clays. R. W. Grimshaw and A. L. Roberts. *Foundry Trade Journal*, v. 76, Aug. 16, '45, pp. 325-328.

An approach to a true synthetic bond. Characteristics of bentonite; American practice; presence of combustible matter; differential temperature; rehydration tests.

14-282. Mold and Core Paints and Washes and Parting Powders. W. J. Rees. *Refractories Journal*, v. 21, July '45, pp. 266-269.

Inception of the investigation on non-siliceous alternatives to silica flour for parting powders and mold and core paints is described. Alternatives to silica flour for parting powders which are quite satisfactory in foundry use are indicated. The trials made with mold and core paints indicate that silica flour can be satisfactorily replaced by non-siliceous materials. Calcined ball clay or aluminous fireclay is satisfactory for small and medium steel castings; for larger castings sillimanite, calcined or fused alumina, and zircon have given satisfactory results. The choice of the most suitable alternative depends on the particular condition of foundry practice.

14-283. Supercharger Buckets Mass Produced by Precision Casting. Arthur E. Focke. *Metal Progress*, v. 48, Sept. '45, pp. 489-494.

Molding and casting process, using the so-called lost wax process long employed for casting dentures and metal appliances for bone surgery, provided the means of obtaining buckets of cobalt-chromium-tungsten alloy in the desired shape, and close enough to size so that final grinding could be more a means of touching up rather than a sizing operation involving actual stock removal.

14-284. Checking of Die Casting Dies. James L. Erickson. *Iron Age*, v. 156, Sept. 20, '45, pp. 64-67.

Necessity over the past few years of obtaining maximum life from die casting dies has increased interest in the causes of fatigue failures. Effects of temperature gradients in increasing the compressive and tensile stresses in the die and thus hastening thermal cracking and the possibility of reducing coefficients of expansion of new die materials for longer die life are discussed.

14-285. Aluminum and Magnesium. W. C. Devereux. *Automobile Engineer*, v. 35, Aug. '45, pp. 323-326.

Advances that have been made in the production of both aluminum and magnesium alloys are clearly shown. To illustrate the progress made in manufacturing processes brief reference is made to a modern large-scale mass production factory. Price trends are discussed and probable developments in the next few years are broadly forecast.

14-286. What Are the Limitations of Die Castings?—A Discussion. *Die Casting*, v. 3, Sept. '45, pp. 50-53.

Need for research to improve die castings; "blow holes"; partings; gate and ejector marks; tolerances; sizes change; variety of die casting; thinner sections; lower die costs; checking of dies; design of castings.

14-287. Re-Melt for Tin-Base Alloy Pressure Die Castings. K. Hiawatsch. *Machinery* (London), v. 67, July 26, '45, pp. 106-107.

One way of helping to prevent gravity segregation from taking place is to maintain a reasonably high temperature, thereby creating a favorable distribution of antimony, lead and tin-copper crystals in the melt, and fixing and perpetuating it by rapid solidification. Gives results of tests.

14-288. Whiteheart Malleable. A. G. Roblette. *Iron and Steel*, v. 18, Aug. '45, pp. 383-386.

Whiteheart malleable iron can be produced without recourse to packing in ore, but the high cost of the atmosphere needed has been a deterrent. Describes a method whereby the cost can be cut to a small fraction. (Institute of British Foundrymen.)

14-289. Investigation of Metal Pouring by Ciné Photography. *Metallurgia*, v. 32, July '45, pp. 135-136.

New technique developed to enable the examination of the flow of metal as it enters a mold.

14-290. Magnesium Ingots. P. Menzen and W. Patterson-Rackwitz. *Metal Industry*, v. 67, Sept. 7, '45, pp. 150-152.

Magnesium alloys can be cast by the continuous casting process even when direct liquid cooling is employed. Use of the continuous casting process on a production scale confirmed. Improvements resulting from its employment; also shows considerable technical and economic advantages. (From *Aluminium.*)

14-291. Gravity Die Casting. A. R. Palmer. *Foundry Trade Journal*, v. 76, Aug. 23, '45, pp. 339-346.

Die design; choke runner for piston castings; die construction; venting; mechanical aids; loose pieces; collapsible cores; sand cores; inserts; coating of the dies; melting and maintaining temperature control.

14-292. Initial Experience in Hydraulic Cleaning in a Steel Foundry Fettling Shop. F. N. Lloyd. *Foundry Trade Journal*, v. 76, Aug. 23, '45, pp. 347-350, 346.

Capacity and operating cost.

14-293. Cause and Control of Magnesium Alloy Microporosity. E. A. G. Liddiard and W. A. Baker. *American Foundryman*, v. 8, Sept. '45, pp. 33-44.

Cause and control of microporosity in magnesium alloys attests the value of this broad exchange of knowledge and ideas for the common advancement of the foundry industry.

14-294. Castings Should Always be Qualified in the Foundry. O. O. Gammon. *American Foundryman*, v. 8, Sept. '45, pp. 54-56.

Methods of casting qualification in the foundry to reduce machine tool costs and facilitate machining. A particular point is the use of less highly skilled operators.

14-295. Split Type Specimen Tube for Elevated Temperature Sand Testing. D. C. Williams. *American Foundryman*, v. 8, Sept. '45, pp. 68-72.

Reproducibility of hot compressive strength values when using two different type cylindrical specimen tubes. 3 ref.

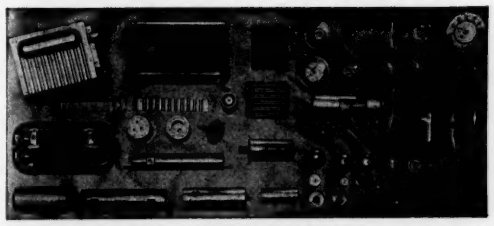
14-296. Postwar Operations of Aluminum Foundries. W. H. Gunselman. *American Foundryman*, v. 8, Sept. '45, pp. 73-76.

Operational controls have enabled foundries in general to meet the specifications demanded for certain wartime castings. Continued rigid controls will retain the confidence of designers and result in wider postwar applications of cast metals as engineering materials. Properly organized maintenance and sales forces will have important parts in the postwar foundry.

15. SALVAGE AND SECONDARY METALS

15-31. Secondary Aluminum. R. R. Caizley. *Engineering Materials and International Power Review*, v. 3, April '45, pp. 73-77.

Main considerations affecting its future use are: Price, available supplies, fabrication capacity. Development; specification-casting alloys; D.T.D. 424; D.T.D. 428; L.A.C. 10; LAC 112A; LAC 113B; L.8; L.24 ("Y" Alloy); L.33; D.T.D. 478; D.T.D. 479.



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16. FURNACES AND FUELS

16-109. Symposium—Disposition of Coke Oven Gas and Blast Furnace Gas. Paul E. Leiss, R. A. Lytle, Harold C. Cox, H. B. Helm, and L. F. Kopsa. *Iron & Steel Engineer*, v. 22, Aug. '45, pp. 71-80, 91.

At Warren Plant, Republic Steel Corp.; at Johnstown Plant, Bethlehem Steel Co.; at Clairton Works, Carnegie-Illinois Steel Corp.; at Campbell Works, Youngstown Sheet and Tube Co.; at Pittsburgh Works, Jones and Laughlin Steel Corp.

16-110. Remelt Equipment for Wrought Aluminum Alloys. Owen Lee Mitchell. *Light Metal Age*, v. 3, Aug. '45, pp. 8-11.

Melting practices for wrought aluminum alloys. Discusses relationship between proper furnace design and product cost, remelting difficulties, and the factors that enter into consideration in the designing of remelting furnaces.

16-111. Operation of an Experimental Open-Hearth Furnace. H. K. Work and W. R. Webb. *Steel*, v. 117, Sept. 3, '45, pp. 138, 140, 142, 192, 194, 196. Also *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 959-964.

Continuous one-way fired furnace built with an all-basic roof employs recuperator for preheating air for combustion. Furnace is capable of producing an 8000-lb. ingot. Procedure followed in working a heat is much the same as conventional open-hearth shop practice.

16-112. Effect of Moisture Additions to the Air Delivered to Blast Furnaces. L. E. Riddle. *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 965-970.

Controlled moisture additions to the blast delivered to the furnaces bring about: Decrease in iron production of approximately 0.5% per grain of moisture added; increase in the coke rate of approximately 1.2% per grain of moisture added; negligible difference in blast furnace regularity and flue dust production; no significant difference in iron quality.

16-113. Setting up Stack Drafts on Combustion Cross-Regenerator Ovens. J. R. Purdy. *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 973-975.

Heating of ovens underfired with coke oven gas. Setting of drafts on a new battery; selection of standard regenerator.

16-114. Maximum Economical Blowing Rates. Roger S. Wilcox. *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 986-990.

Economical aspect; cost with flue dust production; method of computing flue dust produced.

16-115. Ignition Through Fuel Beds on Traveling or Chain Grate Stokers, Part II. E. P. Carman and W. T. Reid. *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 1002-1005.

Curves of ignition for high temperature coke, coke breeze. Ignition through fuel beds on traveling-grate stokers is essentially unrestricted underfeed. After ignition reaches the grate, burning is over-feed, and increase of air rate will give proportional increase of burning rate. Slow initial ignition of the top layer of fuel on traveling-grate stokers is followed by relatively slow rates of ignition travel through the bed. Moisture is necessary to "temper" small-size fuels.

16-116. Symposium on Measurement of Heat Absorption in Furnaces: Part V. *Industrial Heating*, v. 12, Aug. '45, pp. 1318, 1320.

The measurement of heat flow from furnace walls, by Charles B. Bradley.

16-117. New Trends in Metallurgical Heating. *Industrial Heating*, v. 12, Aug. '45, pp. 1340, 1342, 1344, 1346.

Special furnaces and methods; high speed heat transfer; heating light alloys; induction heat treatment of bar stock; flowing electrolytic tin plate; heat treating by radio frequencies.

16-118. Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces, Part XXXI. Wallace G. Imhoff. *Industrial Gas*, v. 24, Aug. '45, pp. 20-21, 36-40.

General review of vital principles involved.

16-119. Developments in Design and Use of Side-Blown Converter Plants. *Industrial Heating*, v. 12, Aug. '45, pp. 1348, 1350, 1394-1395.

Use of the side-blown converter in Great Britain for the manufacture of steel for castings. Summarizes the results of an investigation reported by P. C. Fassotte in a recent paper before the British Iron and Steel Institute.

16-120. Heating Metals and Non-Metallic Materials by Electronics. H. L. H. *Machinery* (London), v. 67, Aug. 9, '45, pp. 141-147.

Considers briefly the ways in which induction and dielectric heating are produced; types of induction heating equipment; elements of an induction heating unit; examples of coils; applications of dielectric heating.

17. REFRACTORIES AND FURNACE MATERIALS

17-44. Permeable Refractories in Furnace Construction. *Iron Age*, v. 156, Aug. 23, '45, pp. 70-71, 141-142.

Large production experimental units in England, wherein the products of combustion are withdrawn through the permeable refractory lining, show considerable promise. The refractories show no tendency to clog and furnace operation appears quite reliable.

17-45. Industrial Electrodes—III. H. Sanders. *British Steelmaker*, v. 11, Aug. '45, pp. 359-363.

Direct arc furnace requirements; oxidation resistance; handling electrodes; jointing the electrode; warehousing; adding a new section; the jointing compound.

17-46. A New Method of Constructing High Density Blast Furnace Bottoms. Fred M. Miller. *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 984-985.

Development in recent years in the technology of ramming mixes and their wide use today makes it possible to expand their use to include blast furnace bottom construction. View of a fractional course of bottom blocks rammed in place against an adjustable form. The brick are set in place far enough apart to permit the use of pneumatic ramming tools between the blocks for compacting the ramming mix to a high density.

17-47. Further Progress in the Development of Refractory Materials. L. Sanderson. *Refractories Journal*, v. 21, July '45, pp. 274-278.

Service life; panel spalling test; apparent thermal conductivity; monolithic linings; roof thickness; action of steam and sulphur dioxide; chlorine attack; sodium salts; dolomite; magnesia-zircon linings; manganese attack.

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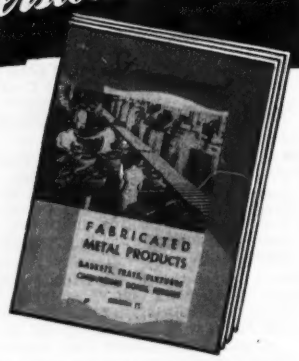

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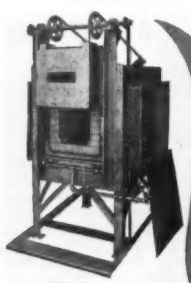

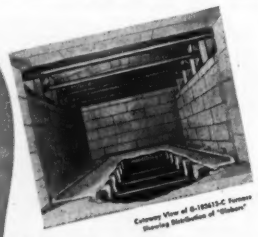

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Metal Literature Review—*Continued*

17-48. Western Steel Plant Obtains 178 Heats From Electric Furnace Roof. E. G. Jones. *Steel*, v. 117, Sept. 10, '45, pp. 124, 127, 130.

Ample expansion joints are provided in laying up roof lining on 40-ton electric furnaces at Pacific Coast plant. New roofs are preheated for 60 hr. before installing on hot furnace. After first heat is tapped roof is cleaned and thin mixture of sillimanite swept into joints. Long life of refractories is obtained.

17-49. Refractories and Masonry Discussed at the Chicago Section Open-Hearth Conference. *Industrial Heating*, v. 12, Aug. '45, pp. 1380, 1382, 1384, 1386, 1388, 1390.

Basic refractories; outlook for all-basic furnace; bottom refractories; density of open-hearth bottoms; super-duty silica brick; suspended silica roofs.

17-50. Permeable Refractories for Furnace Construction. R. H. Anderson, D. C. Gunn and A. L. Roberts. *Gas Journal*, v. 244, July 26, '44, p. 117. *Engineers' Digest* (American Edition), v. 2, Aug. '45, pp. 410-411.

Refractory insulation has been widely and successfully used on the hot face of fuel-fired and electric furnaces working up to 1200° C. or even higher. It has given good heat insulation, and has low thermal capacity.

17-51. The Mechanism of Wear of Open-Hearth Silica Brick Roofs. Mervin A. Fay. *Blast Furnace & Steel Plant*, v. 33, Sept. '45, pp. 1106-1107, 1122-1125, 1127.

Postulates a new theory which agrees with all the known facts concerning the cause of wear. 3 ref.

17-52. Open-Hearth Basic, Silica and Bottom Refractories. V. Gregor. *Industrial Heating*, v. 12, Sept. '45, p. 1564.

Basic refractories, silica refractories and bottom materials for open-hearth furnaces used in the U. S. Steel Corp. plant are enumerated and their use and average consumption discussed.

17-53. Refractories and Masonry Discussed at the Chicago Section Open-Hearth Conference: Part II. *Industrial Heating*, v. 12, Sept. '45, pp. 1566, 1568, 1573-1574.

Mechanism of silica-roof wear, hot-patching practices and the testing of graphite stopper heads are among the subjects discussed.

18. HEAT TREATMENT

18-202. High Speed Gas Heating Technique. Frederic O. Hess. *Western Metals*, v. 3, Aug. '45, pp. 29-30, 33.

Heating steel billet; temperature differential.

18-203. The Annealing of Whiteheart Malleable Iron by a Gaseous Process. A. G. Roblette. *Foundry Trade Journal*, v. 76, July 26, '45, pp. 255-260.

Development of a practical and economical process on an industrial scale. 5 ref.

18-204. Ammonia for Processing Metals. E. R. Woodward and R. J. Quinn. *Metals & Alloys*, v. 22, Aug. '45, pp. 418-424.

How ammonia and its derivatives can be applied to solve problems in case hardening, heat treating, brazing, sintering and welding metals. 11 ref.

18-205. Modern Heat Treating Practice. Arnold P. Seasholtz. *Steel*, v. 117, Sept. 3, '45, pp. 120-122, 176, 178, 180, 182.

Theory of heating and quenching as a means for obtaining ultimate desired physicals in the majority of carbon and alloy steels. Covered in detail are hardenability vs. hardness, effect of various rates of heating and cooling, construction and interpretation of S-curves.

18-206. The Annealing of Whiteheart Malleable Iron by a Gaseous Process. A. G. Robiette. *Foundry Trade Journal*, v. 76, Aug. 2, '45, pp. 275-285.

Annealing cycle; test requirements; after-treatment of whiteheart malleable iron; effects of alloys and composition. 4 ref.

18-207. Aluminum Alloy Sheets and Sections Heat Treated in Specially Designed Furnaces. *Industrial Heating*, v. 12, Aug. '45, pp. 1322. 1324, 1326, 1328, 1330.

Quenching mechanism; element design.

18-208. Surface Hardening of Metals. *Industrial Heating*, v. 12, Aug. '45, pp. 1332, 1334, 1336, 1338.

Selection of frequency and time cycles for induction heating; induction hardening of plain carbon steels; shot for metal peening.

18-209. Case Hardening Anomalies. C. A. E. Wilkins. *Metal Treatment*, v. 12, summer '45, pp. 95-103.

In view of the need for correct manipulation of case hardening steels to limit frictional wear, suggests coordinated minimum hardness, ultimate strength, elongation, and impact figures for all the common carburizing steels. Discusses various aspects of manipulation such as the causes of soft spots, the effects of low temperature tempering, and of working above the normal temperature range. Carburizing heat treatment and grinding operations are cited as main sources of grinding cracks.

18-210. Applying Prepared Atmospheres to Metal Processing. E. G. De Coriolis. *Steel Processing*, v. 31, Aug. '45, pp. 509-513.

Preparation of atmospheres; types of equipment; atmosphere-furnace construction; operation of bell annealer. 6 ref. (From American Society of Mechanical Engineers.)

18-211. The Annealing of Whiteheart Malleable Iron by a Gaseous Process. A. G. Robiette. *Foundry Trade Journal*, v. 76, Aug. 9, '45, pp. 305-310.

Plant and operating conditions; economies of the gaseous process.

18-212. Modern Heat Treating Practice. Arnold P. Seasholtz. *Steel*, v. 117, Sept. 10, '45, pp. 114-116, 172, 174, 176, 178, 180, 182, 184, 186, 189.

Testing for hardenability and other characteristics in steels has developed successfully into four principal techniques. McQuaid-Ehn and Jominy tests; method and choice of quenching media.

18-213. Putting Metal on Its Mettle. Fred W. Whitcomb. *Refrigeration Industry*, v. 2, Sept. '45, pp. 25, 43.

Sub-zero refrigeration processing for cold treatment of metals is an important wartime development with almost unlimited future possibilities.

18-214. Liquid Carburizing of Transmission Gears at the Cleveland Tractor Works. W. A. Silliman. *Industrial Heating*, v. 12, Sept. '45, pp. 1504, 1506, 1508, 1510, 1516.

Performance of the carburizing treatment in electrically heated salt baths has practically eliminated troubles caused by distortion and reduced scrap due to this cause to practically nothing. Salt bath furnaces; operating procedure; carbon steel fixtures; submerged oil spray quench; control equipment and auxiliaries; sand blasting before grinding; production figures; flexibility of installation.

18-215. Heat Treating Tank Parts in Buick Plant. *Industrial Heating*, v. 12, Aug. '45, pp. 1292-1296, 1298, 1300, 1302, 1304, 1306, 1308, 1310, 1312, 1314, 1316.

Batch-type carburizing furnaces; continuous gas-carburizing furnaces; controlled atmosphere continuous hardening furnace; continuous double-muffle hardening furnace; electrically heated hardening and draw furnaces; compound-carburizing furnaces; convection-type continuous draw furnaces; miscellaneous equipment.

18-216. Special Processes Feature Operations of Alfred Heller Heat Treating Company. *Industrial Heating*, v. 12, Aug. '45, pp. 1396, 1398, 1400, 1402, 1404, 1406, 1424-1425.

Box-type heat treating furnaces; salt bath hardening furnaces; nitrate salt bath tempering furnaces; furnaces for high speed steel; convection heated furnaces; oil bath; high frequency electrical induction units; sub-zero apparatus; plating equipment, miscellaneous facilities.

18-217. Recent Developments in Engineering Materials. Archibald Black. *Machinery* (London), v. 67, Aug. 2, '45, pp. 127-130.

Isothermal transformation of steel; interrupted quenches; cold treatment of steel; leaded steels; nitride case-hardening of stainless steels; silicon impregnation of steel; porous-chromium surfacing; die-casting materials and practice; tinless solders.

18-218. High Frequency Dielectric Heating. A. E. L. Jervis. *Electronic Engineering*, v. 17, Aug. '45, pp. 624-628.

Equipment already available; principle.

18-219. A Bibliography of H. F. Heating. *Electronic Engineering*, v. 17, Aug. '45, pp. 629-630.

Title, author, reference.

18-220. Calculations for Dielectric Heating by High Frequency Current. A. J. Maddock. *Electronic Engineering*, v. 17, Aug. '45, pp. 635-640.

Design sheets have been prepared to enable all the necessary factors to be obtained readily by inspection and to show, at a glance, the interdependence of many of the factors.

18-221. Modern Heat Treating Practice. Arnold P. Seasholtz. *Steel*, v. 117, Sept. 17, '45, pp. 132, 134, 137, 164, 166, 168, 170.

Effectiveness of three systems of interrupted quenching in obtaining higher physicals with minimum dimensional changes, distortion, warpage and residual strains as well as scale-free surfaces. Cycle annealing is an additional topic of great interest.

18-222. Effect of Preliminary Heat Treatment on Response to Nitriding of Some Steels. *Industrial Heating*, v. 12, Sept. '45, pp. 1512, 1514, 1516.

Details of the experimental work described and illustrated, and possible explanations of the results obtained.

18-223. Modern Heat Treating Practices. *Industrial Heating*, v. 12, Sept. '45, pp. 1521-1522, 1524, 1526.

Short cycle annealing; propeller heat treatment; advanced quenching practice; controlled gas carburizing; protective atmospheres and gas quenching.

18-224. Hardenability Vs. Percentage of Martensite in Low Alloy Steels. J. M. Hodge and M. H. Orehoski. *Industrial Heating*, v. 12, Sept. '45, pp. 1530, 1532.

Relationship between hardenability and the percentage of martensite in some low alloy steels. Metallographic examination was used to study quenched Jominy test bars to provide the data on which this paper was based. (A.I.M.E. paper.)

18-225. Heat Treating Precision Parts at the A. B. Equipment Manufacturing Company. *Industrial Heating*, v. 12, Sept. '45, pp. 1580, 1582, 1584, 1586, 1588.

Tool hardening equipment; electric salt bath furnace; high temperature, pit type convection furnace; pit type carburizing furnace; pit type draw furnace; electrically heated, pit type nitriding furnace; pot type furnaces; cleaning, testing and inspection.

18-226. Heat Treatment Study of Pearlitic Malleable Cast Iron. R. W. Lindsay and J. E. Atherton. *American Foundryman*, v. 8, Sept. '45, pp. 27-32.

Investigation of certain phases of the heat treatment of pearlitic malleable cast iron—an attempt to show a correlation between the microstructures and hardness values obtained. Heat treatments—oil quenching followed by tempering, and isothermal transformation at various subcritical temperatures. 11 ref.

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18-227. Carburizing and Nitriding. A. H. Allen. *Steel*, v. 117, Sept. 24, '45, pp. 118-119, 166.

Carried out continuously in muffle-type furnace produce file-hard surface and dead-soft centers in thin-gage steel pieces, such as thrust washers and retainer rings.

18-228. Modern Heat Treating Practice. Arnold P. Seasholtz. *Steel*, v. 117, Sept. 24, '45, pp. 153-154, 157, 176, 178, 180.

Defines purpose of carburizing steel and relates explicitly how a hard surface can be produced upon a tough, ductile core.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-251. Shot-Blasting or Shot-Peening Springs and the Effect on Fatigue Life. *Mainspring*, no. 11, Aug. '45, pp. 1-6.

Shot-peening markedly increases the fatigue life of metal parts. It is a surface phenomenon which can be removed by heating. Use of alloy steel from a fatigue point of view is not necessary in fabricating many parts. Properly applied it should save weight by allowing the use of higher stresses. Perfectly smooth surface is not necessarily the best surface to resist fatigue. Fatigue testing is the best way to evaluate shot-peening.

19-252. Wire Drawing. W. F. Randall. *Metal Industry*, v. 67, Aug. 10, '45, pp. 88-90.

Review of modern methods and machines.

19-253. Reactive Wire Drawing, Part I. Janet M. Howden and R. Winstanley Lunt. *Wire Industry*, v. 12, Aug. '45, pp. 411-413, 415.

An extension of the theory of Dr. J. Dick and its application to the energy efficiency in wire drawing. 10 ref.

19-254. Fine Wire of Special Materials. Robert L. Zahour. *Metals & Alloys*, v. 22, Aug. '45, pp. 403-407.

Steps in the manufacture of fine wire of nickel alloys, precious metals, etc., for precision electronic and electrical applications. 3 ref.

19-255. Brass Strip and Sheet. N. F. Fletcher. *Metal Industry*, v. 67, Aug. 17, '45, pp. 101-104.

Object of article is to help those who are concerned with the production of satisfactory strip and sheet, to decide what cause or causes produce the various defects which may occur in or on the surfaces of rolled brass, and so enable them to look for their origin in the correct places.

19-256. Multipunch Innovations. *Steel*, v. 117, Sept. 3, '45, pp. 132, 186.

Special templates and a new numbering device used in conjunction with multipunch presses speed production.

19-257. Kirksite Die Craftsmen. L. W. Smith. *Western Machinery & Steel World*, v. 36, Aug. '45, pp. 355-357.

This alloy of zinc has been the leading die material for the bulk of the forming of airfoil surfaces.

19-258. Influence of Modern Design on Press Forging. *Steel Processing*, v. 31, Aug. '45, pp. 494-495, 525.

Four stage completely automatic continuous-operation forging machine now producing 250 finished forgings per hour. Unusual feature of this forging method is the elimination of all manual handling. Other innovations include a rotary indexing die table, self-aligning punches and mandrel with automatic stripping, combination roller and ring dies for final drawing of the shell, automatic cooling of the punches and mandrel between each operation, and an automatic lubrication system for dies and punches.

19-259. Forging Die Design. John Mueller. *Steel Processing*, v. 31, Aug. '45, pp. 499-500.

To produce forgings with the proper grain flow required for strength, and to avoid cold shuts during the forging operation, it is necessary to design the forging and the forging dies so that the plastic metal is flowed to the contour of the forging without buckle in the fibering. Results of investigation of cracks and flow lines in a drop forged S.A.E. 1040 steel connecting rod.

19-260. Cemented Carbide Reduces Cost of Cold Nosing Shells. C. W. Hinman. *Steel Processing*, v. 31, Aug. '45, pp. 501-502.

Resistance of Carboloy to abrasion; cold nosing steel shells.

19-261. Current Uses of Shot Peening. K. H. Barnes. *Aero Digest*, v. 50, Sept. 1, '45, pp. 153, 155, 157.

Surface fibers are compressed; results of testing; peening methods; high fatigue resistance.

19-262. Shot Peening as a Production Method. K. H. Barnes. *Machine Tool Blue Book*, v. 41, Sept. '45, pp. 241-242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272.

Value of shot peening in lengthening fatigue life; new production machines cut its cost.

19-263. Deep Drawing Filter Cases, Part II. Carl J. Nagel. *Tool & Die Journal*, v. 11, Sept. '45, pp. 119-121.

Deep drawing press work in making the cases for Fram oil filters covers blanking and three-draw operation.

19-264. New Fabrics of Knitted Wire. *Aero Digest*, v. 50, Sept. 1, '45, pp. 118, 166.

Discusses some of the advantages and limitations of these fabrics, and compares them with the commonly known wire cloth.

19-265. Producing Diamond Dies for Superfine Wires. *Industrial Diamond Review*, v. 5, Sept. '45, pp. 196-197.

Investigation of small size diamond dies to improve manufacturing processes so that dies of higher quality could be produced in shorter time and at less cost. Inspection; European methods; National Bureau of Standards method; drilling the bell; drilling the secondary cone; polishing secondary cone and bearing.

19-266. Special Shape Bar—What It Offers the Designer. Richard K. Lotz. *Machine Design*, v. 17, Sept. '45, pp. 141-144, 152.

Case histories point up advantages offered by special-shape bar; deals with parts formerly made by some other process; considering the use of extruded and drawn shapes for the parts of new machines and reappraising the methods and materials used in making parts for machines now in manufacture.

19-267. Stretch Forming of Aluminum. Gilbert C. Close. *Modern Machine Shop*, v. 18, Sept. '45, pp. 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210.

For applications within its scope, the stretch-forming method of shaping parts offers advantages with which the tool engineer should be conversant.

19-268. The Progress of Fine Wire Drawing. Samuel C. Avallone. *Wire & Wire Products*, v. 20, Sept. '45, pp. 623-624, 649.

Advances since 1937.

19-269. Wire Mesh Dies. *Wire & Wire Products*, v. 20, Sept. '45, pp. 626-627.

New process of printing that promises to make large use of various kinds and sizes of wire mesh fabrics in the graphic arts field is described.

19-270. Proposed Commercial Standard for Woven Wire Netting. *Wire & Wire Products*, v. 20, Sept. '45, pp. 630-631, 647.

Purpose is to provide a nationally recognized standard of quality of woven wire netting, to enable consumers and other interested parties to know what sizes and types of woven wire netting are standard and are regularly produced in sufficient volume to reasonably assure their being readily obtainable through normal channels of trade.

19-271. Sintered Carbide Blanking and Forming Dies. *Wire & Wire Products*, v. 20, Sept. '45, pp. 632-633.

Multiply by 10 to 1000 the number of pieces produced per grind, save users in down time from six to eight weeks' production per year, and are expected to lower production costs on thousands of commodities.

19-272. Some Design and Operating Features of a New Blooming Mill. G. A. V. Russell and G. W. Fox. Iron and Steel Institute, Advance Copy, Aug. '45, 12 pp.

Design and operating features of a new 43-in. reversing blooming mill installation which has replaced a lighter mill at the Templeborough plant of the United Steel Companies, Ltd. General layout of the plant and mechanical design of the new mill: roll design and rolling practice adopted are described, and results of actual performance included. Improved auxiliaries which have been installed are a four-way hot-bloom deseamer and a new type of preheating pit furnace for ingots.

19-273. Lightweight Stampings. *Modern Metals*, v. 1, Sept. '45, pp. 22-23.

Stampings made from light metals will find a wide market in the days to come. Herein are pointed out some of the applications for which stampings were used during the war. The knowledge gained by metal stampers should be of great benefit to those who can use stamped light metal products.

19-274. The Heating of Wire in Wire Drawing. E. Siebel and R. Koblitzsch. *Stahl und Eisen*, v. 63, no. 6, '43, pp. 110-113. *Engineers' Digest* (American Edition), v. 2, Aug. '45, pp. 401-403.

Heating of wire due to strain energy; the wire temperature after passing the die; consequences of the heating of the wire.

19-275. Rail and Structural Mill for Volta Redonda Plant Designed for Varied Output. Charles Longenecker. *Blast Furnace & Steel Plant*, v. 33, Sept. '45, pp. 1108-1112.

The mill; hot saw; straightening machine; handling of rails; disposition of structural shapes.

19-276. Tangent Bending: A New Method of Metal Fabrication. *Steel*, v. 117, Sept. 17, '45; pp. 124-128.

Tangent bending is a hybrid method, a cross between press forming and straight bending in which the metal flows during the bending operation and its shape is controlled by a die. Principles of operation.

19-277. Practical Problems of Light Presswork Production. J. A. Grainger. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1369-1376.

Compound tools—how to use them; adaptability of tools; setting and try-out.

20. MACHINING AND MACHINE TOOLS

20-376. Jig Grinders Tackle Production Problems. Frederick C. Victory, *Steel*, v. 117, Aug. 20, '45, pp. 132-133, 176, 178, 180, 182.

Practical, precision machine with a planetary grinding head called the jig grinder has put the final positioning and sizing of holes in hardened work on a true "machine shop practice" basis.

20-377. Production Work on Jig Borers. Carl Himmelright. *Iron Age*, v. 156, Aug. 23, '45, pp. 72-73.

When fixture and gage tolerances are encountered on production work, toolroom procedures are adopted to such operations. Set-up jigs on jig borers for the manufacture of gear frames or housings for gun power drive mechanisms.

20-378. An Investigation of Radial Rake Angles in Face Milling. J. B. Armitage and A. O. Schmidt. *Western Metals*, v. 3, Aug. '45, pp. 9-13.

Negative radial rake angles were found to produce stronger cutting tips. Power required at the cutting edge is higher for the negative radial rake cutter than for cutters with positive radial rake angles. Cutters with negative radial rake angles will stand up longer at the higher speeds. Wear and failure at high speeds on the cutting edge of a positive radial rake angle cutter will soon increase its power consumption above that of a cutter with negative radial rake angles. Best surface finish in high speed milling is produced with a negative radial rake cutter at cutting speeds between 500 and 800 fpm. 6 ref.

20-379. Large Radii on Small Machine Tools. Rudie Regen. *Western Metals*, v. 3, Aug. '45, p. 19.

Simple method of machining precise spherical surfaces at radii greatly in excess of average tool room capacity.

20-380. Broaching Hardened Involute Splines. Carl Himmelright. *Iron Age*, v. 156, Aug. 30, '45, page 36P.

Broaching of involute splines in a hardened, bell-shaped hub. After the forging is machined in turret lathes, the bore is broached to form the involute splines in the hub in the soft state.

20-381. Selection and Use of Diamond Tools. Edward L. Murray. *Iron Age*, v. 156, Aug. 30, '45, pp. 38-41.

Diamond tools are being used now more than ever before. Applications these tools are best fitted for, the types of tools, and the technique for using them are discussed.

20-382. Modern Machine Tools. *Aircraft Production*, v. 7, Aug. '45, pp. 385-387.

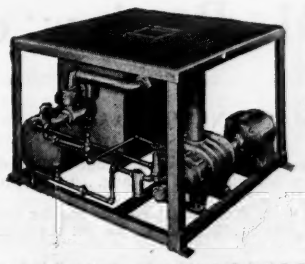
Latest additions to the range of factory plant. Injection molding; gear cutting; pre-filling press.

20-383. Special Feeds Adapt Automatics for Second-Operation Work. Ben C. Brosheer. *American Machinist*, v. 89, Aug. 30, '45, pp. 106-109.

Pick-off arms and cross-slides are used in transferring work. One operator can supervise as many as eight screw machines.

20-384. Coolant Improves Carbide Sawing of Steel and Aluminum Alloy Bars. A. Leonhardt. *American Machinist*, v. 89, Aug. 30, '45, pp. 118-119.

Experimental set-ups indicate that high speed sawing costs may be reduced so they compare favorably with burn-mill costs.



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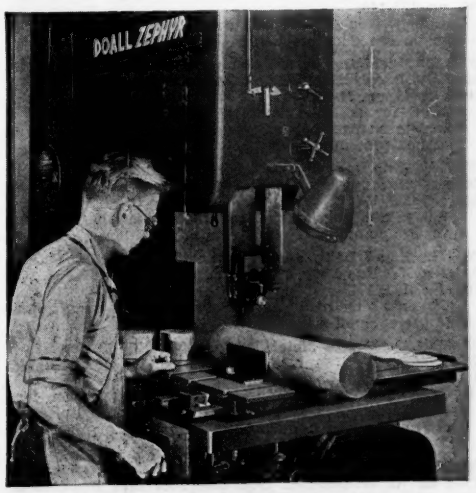

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A.S.M. Review of Current Metal Literature — *Continued*

20. MACHINING (*Cont.*)

20-385. **Gear Tooth Curvature Treated Simply.** Ernest Wildhaber. *American Machinist*, v. 89, Aug. 30, '45, pp. 122-125.

A continuous use of tooth normal facilitates broader determination of the curvature data which control the load capacity of tooth surfaces.

20-386. **Statistical Control of Assemblies Eliminates Selective Fitting.** Benjamin Epstein. *American Machinist*, v. 89, Aug. 30, '45, pp. 126-127.

Manufacturing engineers often face the problem of relating assembly tolerances and those established for component parts. A method that permits random assembly.

20-387. **Practical Ideas.** *American Machinist*, v. 89, Aug. 30, '45, 131-136.

Quick releasing chuck for holding second operation threaded parts. Chuck attachment simplifies holding of shoulder bolts. Accurate spacing gages for gang milling cutter set-up. Threaded lock-pin replaces taper pin in toolholder. Hydraulic jack presses or pulls welding machine rotors. Router bit collet holds tool concentric and tight. Preheating valve disks before refacing with stellite. Countersinking to constant depth with power-controlled spindle. Three-piece heavy duty bearing bored in a large lathe. Electric drill chucks removed without damaging gears. Rubber stamp locates dimensions for jig boring holes. Joggle die adjustable for various amounts of offset. Locator for correct positioning feeds blank to drawing die. Micrometer depth attachment for pneumatic drills.

20-388. **Machine Tool Industry Faces New Challenges and Opportunities.** Guy Hubbard. *Steel*, v. 117, Sept. 3, '45, pp. 124-126, 184.

Postwar becomes sudden reality, and sweeping conversion to peacetime production begins.

20-389. **Calculation of Dovetail and Flat Forming Tools With Top Rake.** John H. Beck. *Screw Machine Engineering*, v. 6, Aug. '45, pp. 54-62.

Mathematical presentation.

20-390. **Selection and Use of Diamond Tools.** Edward L. Murray. *Iron Age*, v. 156, Sept. 6, '45, pp. 94-96.

Machine tool design for using diamond tools, wheel dressing, diamond abrasives, etc.

20-391. **Precision Milling at High Speed.** William Lawrence Lewis. *Western Machinery & Steel World*, v. 36, Aug. '45, pp. 344-347.

Describes procedures in Adel shops concerned with milling material to the shape and dimensions required by the design of the parts and the tooling to make them.

20-392. **Recommendations for Grinding of Cutters for High Speed Carbide Milling.** *Western Machinery & Steel World*, v. 36, Aug. '45, pp. 362-364, 372-373.

Effective and workable technique that produces all the requirements for successful cutter preparation. These include: A smooth cutting edge, free from defects; a fine surface finish on the carbide; consistent results; economical methods, i. e., rapid production grinding without jeopardizing the first three points.

20-393. **Crankshaft Production for the Napier Sabre Engine.** *Machinery* (London), v. 67, July 19, '45, pp. 57-64.

Two six-throw crankshafts each run in seven lead-bronze bearings of the steel-shell pattern. Each crankshaft at its forward end meshes with a pair of compound reduction gears and the large diameter helical gear of the air-screw shaft, which is on the center line of the engine, midway between the two crankshafts, is engaged by the forward pinions of the four compound gears. The two crankshafts rotate in the same direction. They are machined from drop forgings of nitriding steel the material conforming to D.T.D. specification 228, or alternatively, D.T.D. specification 306.

20-394. **Production Processes. Part III. Automatic Screw Machining.** Roger W. Bolz. *Machine Design*, v. 17, Sept. '45, pp. 135-140.

Design; long slender parts a problem; tolerances; limits sometimes reduce production.

20-395. **Machining Bronze Counterweights for B-29 Crankshafts.** Joseph Geschelin. *Automotive Industries*, v. 93, Sept. 1, '45, pp. 22-24, 94.

Need for positive clamping devices brought about a complete change in tooling and fixture design as well as modified procedures.

20-396. **Chip and Oil Salvage is Profitable.** H. O. Stock. *Modern Machine Shop*, v. 18, Sept. '45, pp. 140-142, 144, 146, 148, 150, 152, 154.

Centralized chip and oil reclaiming plant has paid for itself in approximately two years of operation.

20-397. **Small Drills are Important Tools.** K. H. Luther. *Modern Machine Shop*, v. 18, Sept. '45, pp. 160, 162, 164, 166, 168, 170, 172, 174.

Presents some of the results of research in the grinding and use of small drills.

20-398. **The Art of Metal Cutting, Part X.** *Machine Tool Blue Book*, v. 41, Sept. '45, pp. 156, 158, 160, 162, 164, 166, 168, 170.

Technique for the milling of cast iron and the non-ferrous materials such as aluminum, magnesium and plastics. Only in a few incidentals does the method of machining vary.

20-399. **Recent Progress in Milling Machine Operations, Part II.** C. W. Hinman. *Machine Tool Blue Book*, v. 41, Sept. '45, pp. 174, 176, 178, 180, 182, 184, 186, 188, 190, 192.

Hand milling machines.

20-400. **Maximum Results from Borizing.** C. G. Nordmark. *Machine Tool Blue Book*, v. 41, Sept. '45, pp. 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222.

Typical set-ups designed for high production on a precision basis are described.

20-401. **Interchangeable Fixtures Developed for Machining Superfortress Spars.** Leon Mooradian. *American Machinist*, v. 89, Sept. 13, '45, pp. 110-112.

Special routing templet clamping fixtures assure contour accuracy of aluminum spars. Phototemplets are used to guide set-up changes and insure reproduction of contours to lofted dimensions.

20-402. **Direction of Adjustment Affects Cutter Efficiency.** R. R. Weddell. *American Machinist*, v. 89, Sept. 13, '45, p. 112.

Milling cutter blades generally show maximum wear on the peripheral edge while the face remains comparatively sharp. Consideration of this fact and a modified disposition of the inserted blades in cutters results in maximum life with minimum grinding.

20-403. **Cemented Carbide Ways Increase Accuracy of Tool Grinder.** James R. Longwell. *American Machinist*, v. 89, Sept. 13, '45, pp. 118-119.

Replacement of cast iron dovetail slides and ways with cemented carbide members adds precision to profile grinding over long periods of service.

20-404. **Taper Turning Beyond Graduations on Standard Bench Lathe Compound.** Fritz L. Keller. *American Machinist*, v. 89, Sept. 13, '45, pp. 129-130.

Angular and cylindrical cuts taken in continued operation by using cross-slide to turn taper and compound-slide for cylindrical portion of work.

20-405. **Practical Ideas.** *American Machinist*, v. 89, Sept. 13, pp. 131-136.

Progressive punching tools avoid material loss. Adjustable fly-cutter increases accuracy and stops chatter. Portable machine faces many pipe flange sizes. Round guides replace V-ways for sliding journal boxes. Milling machine heads used for cutting caulking bevels. Thickness between counter-bored holes checked with turret gage. Micrometric lathe stop for close tolerance work. Broken drills removed from angle drill chucks. Pipe chuck adaptor for machining lapped-joint stub ends. Strap bending fixture for forming intricate shapes. Thin bar stock straightened by punch press holdown. Multiple cutting-off tool for producing spacer tubes.

20-406. **Carbides Cut Costs on Small Parts Production.** C. H. Speakman. *Production Engineering & Management*, v. 16, Sept. '45, pp. 67-70.

Used in non-cutting tools, cemented carbides are finding new and broader applications in metal working. Revealed here are carbide applications in which die life has been increased 100 times over that with conventional steel.

20-407. **Unique Boring Fixture Increases Product Output.** Gerald E. Stedman. *Production Engineering & Management*, v. 16, Sept. '45, pp. 73-76.

New diamond bore fixtures reduce salvage and downtime for adjustment. This new-type fixture virtually eliminates tool marks and enables consistent perfect spherical radius.

20-408. **Crusher Roll Profiling of Grinding Wheels.** A. W. Ehlers. *Tool & Die Journal*, v. 11, Sept. '45, pp. 115-118, 143.

Form tool of intricate profile and resultant high maintenance costs combine in an ideal test case for crusher roll profiling. Contributes valuable know-how to this relatively new technique, with promise of more to come. Using circular form tool as experimental crusher; final crusher roll design; life and grain characteristics of crushed wheel; silicon carbide crushing; roll crushing in production grinding; reversed crushing procedure; crushing surface speeds; feeds and coolants; roll crushing for centerless grinding.

20-409. **Connecting-Rod Production for the Napier Sabre Engine.** *Machinery* (London), v. 67, July 26, '45, pp. 85-90.

Connecting rods are of the usual forked and plain pattern, each pair of rods operating in conjunction with a steel split-shell big-end bearing which is lined internally and externally with lead bronze. The split-bush is gripped by the forked rod, but the plain connecting rod is free to oscillate on the bush when the engine is in operation. The gudgeon-pin bores of both forked and plain rods are bushed, the bushes being shrunk into position and afterwards diamond-bored in the usual way. Confines attention to some of the more interesting operations employed in the production of the forked rod, a drawing of which is given.

20-410. **Mechanized Brazing.** *Machinery* (London), v. 67, July 26, '45, pp. 99-100.

Appreciable economies in time, fuel and compressed air have been effected in the brazing of under-carriage jacks for heavy bombers, compressed air bottles, and similar assemblies, by the use of a mechanically operated multi-blowpipe device. The complete brazing operation on each end of the under-carriage jack, for example, now takes only 2 min., as compared with 20 min. by previous hand methods.

20-411. **Machining Cylinder Heads and Sleeve Cranks.** *Machinery* (London), v. 67, Aug. 2, '45, pp. 113-118.

Machined from castings in light alloy. Design of the cylinder head is necessitated by the employment of sleeve valves which move on the cylinder heads with a combined reciprocating and turning motion, so that the heads may be likened to fixed pistons. To provide for cooling the cylinder heads when the engine is in service, the castings are hollow. Each casting has a ring groove machined in it, and in the finished engine it carries two sparking plugs.

20-412. **A Method of Grinding Boring-bar Cutters.** R. S. *Machinery* (London), v. 67, Aug. 2, '45, p. 119.

Difficulties overcome by making a simple block to hold the cutters and having faces machined to suit the cutter faces.

20-413. **Studies on the Machinability of Carbon and Alloy Steels.** G. P. Witteman. *Mechanical Engineering*, v. 67, Sept. '45, pp. 575-583.

Machinability of cold finished bars and parts produced from this material on what are commonly known as screw machines. Fundamentals of steelmaking; studies of machinability of steels; machinability essentials for automatic-machine product; determining quality from chips; microscopic examination of specimens; removing metal properly; machining alloy steels for ammunitions; suggested structures for machinable alloy steels.

20-414. **Contour Control Minimizes Hunting and Velocity Errors.** Oren G. Rutemiller and H. Earl Morton. *Machine Design*, v. 17, Sept. '45, pp. 103-107.

Utilizes duplicate controls; relief motors start cutting cycle; adjusts load automatically.

20-415. **Machining Aero-Engine Rocker Covers.** *Machinery* (London), v. 67, Aug. 9, '45, pp. 149-150.

Setting the casting in position; the milling operations.

20-416. **Securing Fine Surfaces.** H. J. Wills. *Machinery* (London), v. 67, Aug. 9, '45, pp. 151-152.

Lapping operations in the tool room. Silicon carbide compounds; diamond compounds; gage lapping.

20-417. **Economic Systematic Setting of Automatic Screw Machines.** G. B. Booth. *Machinery* (London), v. 67, Aug. 9, '45, pp. 152-153.

All set-ups for auto-screw machines should be provided with a cam design or tool layout sheet, giving necessary speeds, feeds, and tool positions. From this, the toolsetter should first complete all those operations that do not concern the action cycles, such as the changing of spindle gears, belting, etc. Cleaning agent, such as paraffin oil, should be handy, so that parts which may have to be dismantled may be refitted in a clean condition. This applies also to tooling to be returned to stores.

20-418. **Stock Removal as a Measure of Tool Life and Power Consumption.** G. Schlesinger. *Machinery* (London), v. 67, Aug. 9, '45, pp. 154-155.

By knowing the cutting area and choosing the cutting speed according to tool quality, material resistance, and wear properties, the rate-fixer can approximately calculate the net horsepower, and by assuming an efficiency for the machine tool, arrive at the total input horsepower and select a machine. Machine tool efficiency factor varies between 0.45 and 0.9 according to load, speed, degree of maintenance, and age of the machine tool. Thus, the rate-fixer requires a thorough knowledge of the plant; otherwise calculations will be wrong.

20-419. **Laboratory Control in Machine-Tool Production.** *Machinery* (London), v. 67, Aug. 16, '45, pp. 169-173.

Equipment and methods at the works of A. A. Jones & Shipman, Ltd. Checking surface finish with the profilometer; checking indexing wheels; using the Hilger Angle Dekkor.

20-420. **Machining Group Forged Trip Levers.** F. H. *Machinery* (London), v. 67, Aug. 16, '45, pp. 175-177.

The outline of the grouped forging; holding the work for the first operation.

20-421. **Lapping Operations in the Production of Gears and Worms.** H. J. Wills and H. J. Ingram. *Machinery* (London), v. 67, Aug. 16, '45, pp. 184-185.

Compounds for lapping gears; lapping compounds suitable for hypoid and spiral bevel gears; lapping worms and worm-gears.

20-422. **A Symposium: Crush Dressing of Grinding Wheels for Form Tool Grinding.** *Tool Engineer*, v. 15, Sept. '45, pp. 18-28.

Surface grinding of precision contours, by C. J. Wilson; The selection of wheels, by Leslie B. Bellamy; The tools for crush dressing, by L. A. Kitchen; The economics of crush dressing, by Wm. Moreland; Engineered crush dresses, by Gunnar Skog.

20-423. **Abrasives and Their Uses in Industry.** O. McIntyre. *Tool Engineer*, v. 15, Sept. '45, pp. 29-33.

Modern abrasives are cutting tools which may be infinitely formed for intricate shapes and high quality surface finishes.

20-424. **From Tool Making to Simplified Broaching.** Rex Heath. *Tool Engineer*, v. 15, Sept. '45, pp. 46-48.

New approaches to old problems lead to a new line of light production machines.

21. LUBRICATION AND FRICTION; BEARINGS

21-68. **Lubrication of Metal Surfaces by Fatty Acids.** F. P. Bowden, J. N. Gregory and D. Tabor. *Nature*, v. 156, July 28, '45, pp. 97-101.

Effect of chain length; film thickness; effect of temperature; nature of the underlying surfaces; lubricating properties of metal soaps; mechanism of boundary lubrication. 19 ref.

21-69. **Cutting Oils for Machining Metals.** Edwin Laird Cady. *Metals & Alloys*, v. 22, Aug. '45, pp. 431-446.

Types and characteristics; some comparisons; handling and treating; for specific operations; materials, and machinabilities.

21-70. **Cutting Oil Comes Back.** Edwin Laird Cady. *Scientific American*, v. 173, Sept. '45, pp. 151-152, 154.

Plain water, water-and-oil mixtures, and straight oils all have helped to speed machining processes and make them more accurate. Every time tool materials changes seemed to point to the possibility of eliminating cutting oils from the machine, it was found that better work could be accomplished by keeping them on the job.

21-71. **Refrigeration of Coolants for Machine Tools.** B. S. Williams. *Machinery*, (London), v. 67, July 19, '45, pp. 72-73.

By cooling cutting oil to approximately 70° F. cutting time per cylinder reduced from ½ hr. and 50 min. to 1 hr. Damage to drills materially reduced and less machine time was lost. Cites advantage.

21-72. **Bearing Development Up to Date.** Henry W. Luetkemeyer. *National Petroleum News*, v. 37, Sept. 5, '45, pp. R-718, R-720, R-722, R-724.

In general, bearing life is characterized by three qualities: Resistance to fatigue, surface action, corrosion or wear. Roughly classifies different types of service in terms of hours of life.

21-73. **Functional Testing of Lubricating Greases.** J. F. MacPhearson. *General Electric Review*, v. 48, Sept. '45, pp. 42-47.

Provides a realistic means of evaluating bearing greases. How applied with respect to aircraft generators.

21-74. **Silver Bearings.** E. B. Etchells and A. F. Underwood. *SAE Journal*, v. 53, Sept. '45, pp. 497-503.

Describes some of the salient factors affecting the process and performance of silver bearings as related to present-day applications; first tests; faults of early silver bearings; improvements in running characteristics; performance characteristics; fatigue; score resistance and embeddability; corrosion resistance; functional relationship of materials. When properly prepared and bonded to the bearing backing its resistance to fatigue is greater than that of any other known metal.

21-75. **Magnetic Coolant Separators.** *Steel*, v. 117, Sept. 17, '45, pp. 130, 163.

Metal and abrasive particles carried by coolants are quickly removed by this automatic continuous-flow unit, eliminating danger of damage to precision-finished surfaces.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-463. **Progress in Heliarc Welding.** T. E. Piper. *Automotive Industries*, v. 93, Aug. 15, '45, pp. 27-28, 78.

Short history of the process.

22-464. **One-Station Variable Speed Control Adds Flexibility to Automatic Welding.** *Steel*, v. 117, Aug. 27, '45, pp. 103, 148, 150, 152, 154.

In automatic welding two elements control the speed of production: Welding time and handling time. Handling time as the principal factor for consideration discussed.

22-465. **A Symposium on Special Shapes for Welding.** D. B. Wilkin. *Steel*, v. 117, Aug. 27, '45, pp. 104-107, 150, 152, 154.
Steel fabricators describe types of sections which would facilitate production of finished products. Half of over 1900 plants want more special shapes.

22-466. **Resistance Welding Fundamentals.** F. R. Woodward. *Welding Journal*, v. 24, Aug. '45, pp. 713-725.
Product design considerations; spot welding; seam welding; projection welding; butt welding; flash welding; materials to be welded; welding of dissimilar materials.

22-467. **Shop Notes on Welding Stainless Steel.** Vincent J. Shanahan. *Welding Journal*, v. 24, Aug. '45, pp. 727-729.
Comparison of welding carbon steel and stainless steel; effects of heat on stainless steels; selection of the type of electrodes; selection of sizes and quantity of electrodes; operating instructions; oxy-acetylene welding.

22-468. **Research—an Irresistible Force.** Howard E. Fritz. *Welding Journal*, v. 24, Aug. '45, pp. 741-745.
Welding research is of recent growth, but, as with all other processes and products, it is necessary for progress. Refusal to experiment, or to change as a result of the information available from experiment, leads to stagnation and decay.

22-469. **A Welded Swing Bridge Made of Low Alloy Steel.** M. Baudelaire. *Welding Journal*, v. 24, Aug. '45, pp. 401s-403s.
Description of the bridge; description of the members; the nature of joints; base metal; weld metal; welding procedures; inspection of welds.

22-470. **An Investigation of the Spot Welding of Aluminum Alloys Using Condenser-Discharge Equipment.** W. F. Hess, R. A. Wyant and B. L. Averbach. *Welding Journal*, v. 24, Aug. '45, pp. 404s-412s.
Comparative study of three different types of welding equipment which are offered for the spot welding of aluminum alloys for aircraft structures. Equipment; procedure and results.

22-471. **Production Technique and Quality of Flash-Welded Joints.** Hans Kilger. *Welding Journal*, v. 24, Aug. '45, pp. 413s-432s.
Methods and equipment; welding procedure and terminology; welding schedules and machine limitations; preheating and flashing; heating the work—influence of welding on structure and heat-effect zone; tensile strength and hardness. (Translation of Fertigungstechnik und Güte Abbrenngeschweisster Verbindungen.)

22-472. **Resistance Welding, Part I.** R. W. Ayers. *Aircraft Production*, v. 7, Aug. '45, pp. 379-384.
Modern developments and applications in up-to-date fabrication methods.

22-473. **Cutting of Stainless Steels by Torch Made Possible by New Equipment.** *Blast Furnace & Steel Plant*, v. 33, Aug. '45, pp. 981, 983.
Quality production cutting of stainless steels solved through development of the Airco flux-injection system. Description.

22-474. **Spot Welding Aluminum.** F. Roper-Lowe. *Metal Industry*, v. 67, Aug. 17, '45, p. 104.
Novel method using low current density.

22-475. **Welding Fluxes for Magnesium.** *Light Metals*, v. 8, Aug. '45, pp. 380-381.
Recently patented flux compositions designed to overcome special difficulties encountered in welding certain of the newer ultra-light alloys.

22-476. **Steel Welding Costs and Electrode Selection.** Orville T. Barnett. *Metals & Alloys*, v. 22, Aug. '45, pp. 408-414.
How to select mild steel arc welding electrodes to satisfy quality requirements while achieving the lowest possible over-all operating cost. 8 ref.

22-477. **Skin Heating.** *Iron Age*, v. 156, Sept. 6, '45, pp. 86-87.
Improved surface finish is being obtained in aircraft by thermal expansion of the light-alloy skin prior to riveting. Practice suggests possibilities for fabrication of certain peacetime goods.

22-478. **Automatic Control Speeds Production Welding.** *Production & Engineering Bulletin*, v. 4, June '45, pp. 114, 116, 119.
Long or short production runs can be set up with equal ease as a result of the new welding tools and controls now available. Handling time again has become the principal factor for consideration.

22-479. **Man-Hours Saved During Welding.** *Production & Engineering Bulletin*, v. 4, June '45, p. 203.
How waste heat generated during welding was used for preheating the work to save labor and fuel.

22-480. **Speeding Work in a Welding Shop.** *Production & Engineering Bulletin*, v. 4, June '45, pp. 213-215.
How a well-designed shop layout helped the flow of work, from the entrance of parts to the exit of a welded and painted product.

22-481. **Welding Technique in Construction of Fairchild "Packet".** James A. Wales, Jr. *Steel Processing*, v. 31, Aug. '45, pp. 496-498.
Biggest welding job in connection with production is found on the cargo plane's landing gear. Details given.

22-482. **New Developments in Aluminum Brazing.** Mike A. Miller. *Metal Progress*, v. 48, Sept. '45, pp. 477-483.
Discussion limited to some of the newer developments; illustrates a few of the current applications. Emphasis placed mainly on torch, furnace and flux bath procedures. A few of the special techniques developed during the past few years also considered.

22-483. **A Preliminary Investigation of the Constitution of Mild Steel Arc Weld Deposits.** H. A. Sloman, T. E. Rooney and T. H. Schofield. Iron & Steel Institute, Advance Copy, July '45, 29 pp.
Oxygen, hydrogen and nitrogen contents of mild steel weld deposits laid down under certain standard conditions, and also the form in which the oxygen is present, have been determined. Deposits from six different electrodes were found to differ appreciably in their contents of the gaseous elements. Observations connecting these differences with the compositions of the electrode coatings have been made. 4 ref.

22-484. **Welding as an Important Tool in Aluminum Fabrication.** W. J. Conley. *Aluminum & Magnesium*, v. 1, Aug. '45, pp. 28-31.
Process shows consistently lower costs and higher rates of production than any previously known methods of fabrication.

22-485. **New Automatic Riveting Machine.** *Aero Digest*, v. 50, Sept. 1, '45, pp. 120-121.
Drivmatic automatic riveting machine drills and countersinks the rivet hole. Combined metal thickness may become as great as ⅜ in. Machine gages the combined metal thickness, drills and countersinks the hole, then selects, inserts, and heads one of five lengths of rivets of the same head style and body diameter.

22-486. **Tapping Screws.** Walter M. Hanneman. *Fasteners*, v. 2, no. 3, pp. 4-7.
Offer an economical medium for certain types of fastening.

22-487. **Cold Riveting Gains Acceptance.** *Fasteners*, v. 2, no. 3, pp. 16-17.
With properly controlled pressures, cold driving of large rivets offers a number of advantages. Holes are completely filled, caulking against leaks is unnecessary, rivets attain superior physical characteristics, and the cost is reduced by elimination of heating and easier handling of cold rivets.

22-488. **Multiple Brazing.** G. W. Birdsall. *Steel*, v. 117, Sept. 10, '45, pp. 108-111, 156, 158, 160, 162, 164, 166.
Makes five brazed joints simultaneously in typical small pressure vessel used as insecticide container. Millions of units processed by copper brazing in controlled atmosphere furnaces show process to be extremely effective low-cost mass production method of joining steel parts.

22-489. **Pointers on Preparing Workpieces for Flame-Cutting Operations.** G. V. Slottman. *American Machinist*, v. 89, Sept. 13, '45, pp. 106-109.
Mounting techniques, essential fixtures and methods for the correction of cuts in progress are discussed.

22-490. **Flash Welding of Sheet Brass.** T. Watson and A. J. Hipperson. *Iron Age*, v. 156, Sept. 13, '45, pp. 55-59.
In adapting flash-butt welding methods to non-ferrous metals, difficulties have been encountered by the manufacturers of small parts. Details of a recently established method which has been found efficient for flash-butt welding thin sections of brass. (From British journal *Welding*.)

22-491. **Edge Preparation of Ship Plate.** Cyril Provo Hubert. *Iron Age*, v. 156, Sept. 13, '45, pp. 60-63, 148.
Utilization of mechanical cams in conjunction with a flame-planer permits trim edging of plate edges to any desired contour and combination of bevels within limits of ± 0.003 in. High quality welds result, and twice the production rate is obtained than by use of hand-operated cutting equipment.

22-492. **"Whale" Piers for "Mulberry".** A. Lamond and R. G. Braithwaite. *Welding*, v. 13, Aug. '45, pp. 287-294.
"Whale" piers played a vitally important part inside the famous Mulberry Harbors; describes the fabrication and production of the floating bridges for the "Whale" project. Work described involved the fabrication of 9500 tons of steel and 350 miles of welding within a period of nine months.

22-493. **Manual Welding Manipulators.** F. W. Sykes. *Welding*, v. 13, Aug. '45, pp. 295-302.
Construction and application.

22-494. **Welded Machinery Parts.** Edward J. Charlton. *Welding*, v. 13, Aug. '45, pp. 303-306.
Various developments in the welded design of machine components with many examples to prove the advantages of the latest methods of fabrication.

22-495. **Binding Agents for Flux Coatings.** W. Andrews. *Welding*, v. 13, Aug. '45, pp. 307-312.
Recent developments in the application of alternative inorganic binding agents for the flux coatings of metallic arc electrodes and welding rods. 14 ref.

22-496. **Repairs in the Gas Industry.** J. K. Johannesen. *Welding*, v. 13, Aug. '45, pp. 313-315, 318.
Examples of maintenance work.

22-497. **New Electrode Plant.** *Welding*, v. 13, Aug. '45, pp. 316-318.
Capacity of 350 coated rods per minute; new design of die head; heat treatment.

22-498. **Welding in Palestine.** P. Lidor. *Welding*, v. 13, Aug. '45, pp. 319-320.
Stainless steel equipment for food production.

22-499. **Line Drop Produced by Resistance Welders.** R. L. Longini. *Electrical Engineering*, v. 64, Sept. '45, pp. 619T-622T.
Resistance welding machines normally form a very reactive pulsating load on a power system which sometimes produces undesirable line regulation. The regulation can be calculated, and, if it is too high, it can be reduced by operation directly on 2300 volts or by power factor correction means. From a line regulation point of view, the system of 2300-volt operation is usually the most satisfactory. The effect of electronic controls on line drop is also discussed.

22-500. **When the Welding Load Outgrows the Distribution Power Supply.** C. N. Clark and C. M. Stearns. *Electrical Engineering*, v. 64, Sept. '45, pp. 645T-647T.
Ability of a 2300 to 4000-volt distribution system to supply single-phase a. c. welders is limited not only by current-carrying capacity, but also by voltage regulation. The voltage limitations are reviewed and methods suggested for increasing the limits by changes in the power system and the customers' installations. Three types of subtransmission connections are described for use when the welding load outgrows the distribution power supply.

22-501. **Thermal and Metallurgical Aspects of the Welding of Hot-Dip Galvanized Steel.** E. F. Pellowe and F. F. Pollak. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1423-1426.
Mechanical pressure; general technical comments.

22-502. **The Welding of Non-Ferrous Metals. Part VI.** E. G. West. *Sheet Metal Industries*, v. 22, Aug. '45, pp. 1427-1433, 1438.
Fundamentals involved; resistance welding plant.

22-503. **Industrial Electrodes, IV.** H. Sanders. *British Steelmaker*, v. 11, Sept. '45, pp. 409-412.
Some notes on best means of preventing avoidable wastage in electrode consumption.

22-504. **Overseas Workshop Welding Instructions.** M. H. Vuchnich. *Industry & Welding*, v. 18, Sept. '45, pp. 40-41, 94-99.
General rules for welding procedure. Clear, concise descriptions and limitations will be of value to the man in rural areas and to many newcomers.

22-505. **Ingenuity Speeds Transmitter Tube Brazing.** *Industry & Welding*, v. 18, Sept. '45, pp. 42-43, 86-89.
Where brazing of small parts must be perfect this technique should be of real interest.

22-506. **Automatic Arc Welding Speeds Marine Equipment.** *Industry & Welding*, v. 18, Sept. '45, pp. 49, 51.
Submerged arc welding installation. Typical of many for heavy duty fabrication jobs calling for high quality welds to meet the rigid specifications of the American Bureau of Shipping.

22-507. **Welding Band and Circular Saw.** Lee Brady, *Industry & Welding*, v. 18, Sept. '45, pp. 76-77, 79-81.
Used for emergency, as well as for permanent repairs, and is proving both inexpensive and serviceable.

22-508. **Flash Butt-Welding Heavy Sections.** Irwin H. Such. *Steel*, v. 117, Sept. 17, '45, pp. 116-118, 150, 152, 154.
Huge 1200-kva machine designed to join shafts to jet engine turbine wheels in 135 sec. can handle shafts ranging from 1 to 6 in. in diameter, 12 to 72 in. in length and wheels from 5 to 40 in. in diameter.

22-509. **Radio Heating and Mass Production Soldering.** Christopher E. Tibbs. *Electronic Engineering*, v. 17, Aug. '45, pp. 631-633.
Reviews possibilities which have been opened up by this technique.

22-510. **Welded Reduction-Gear Cases.** C. E. Sommarstrom and Fred M. Burt. *Welding Engineer*, v. 30, Sept. '45, pp. 39-41.
30-ton welded housings for 8500-hp. marine reduction gears. Welding positioners of 1½, 7 and 20 tons help to turn out a complete case a week with a crew of only eight fitters and welders.

22-511. **Arc Welding Pure Aluminum.** F. H. Keating. *Welding Engineer*, v. 30, Sept. '45, pp. 42-43.
British chemical industry needed vessels of high-purity aluminum to withstand corrosion. Metallurgists overcame the welding difficulties by switching to the metal-arc process—and a new type aluminum electrode.

22-512. **New Control for Automatic Welding.** *Welding Engineer*, v. 30, Sept. '45, pp. 44-45.
Application of a variable-speed drive turns the welding positioner into a brand-new tool for automatic welding. Any table speed from 0.3 to 3 rpm. can be obtained, and welding and table rotation are started simultaneously.

22-513. **Better Jobs From Flame-Cutting.** A. F. Chouinard. *Welding Engineer*, v. 30, Sept. '45, pp. 46-49.
How to get the most out of shape-cutting machines. Types of machines and tracing devices, when to build a template, nesting methods, template storage and work tables are some of the topics discussed.

22-514. **Brazing Replaces Soldering.** W. Scott. *Welding Engineer*, v. 30, Sept. '45, pp. 50-53.
Need for wartime conservation of tin has led to an ever increasing use of brazing or hard soldering for various metal-joining tasks. Extra advantages such as strength and electrical conductivity are often found.

22-515. **Spot Welding Locomotive Cabs.** W. H. Cochran. *Welding Engineer*, v. 30, Sept. '45, pp. 54-56.
Diesel-electric locomotive cabs are being made by spot welding light-metal sheets to formed stiffeners. Spot welding is also used for engine cabs and other parts.

22-516. **Welded Bearings for Frigates.** G. G. Landis. *Welding Engineer*, v. 30, Sept. '45, p. 57.
Advantages of fabricating bearings by welding are strikingly demonstrated in the design of big bearings for Frigate escort vessels of the Maritime Commission.

22-517. **Removal and Repair of Steel Casting Defects.** R. A. Pomfret. *American Foundryman*, v. 8, Sept. '45, pp. 48-53.
Flame-gouging and welding as means of removal and repair of structurally unsound areas in critical castings have reduced casting repair costs. The more searching inspection methods now in general use have shown that repair welding can be eliminated to a great extent by provision for sub-sectioning and weld location in the casting design. Flame gouging-welding techniques for casting repair, as well as precautions to be observed, are described in detail.

22-518. **Silver Brazing of Steel Parts.** A. N. Setapen. *Steel*, v. 117, Sept. 24, '45, pp. 112-115.
Expanded rapidly under stimulus of war demands. Advantages include high strength, gas tightness, fast production, low cost.

23. INDUSTRIAL USES AND APPLICATIONS

23-215. **Ball and Roller Bearing Steels.** Hudson T. Morton and Earl E. Wagner. *Steel*, v. 117, Aug. 27, '45, pp. 100-102, 144, 146.
Over the years, many different steels have been tried for ball and roller bearings, but carbon-chromium and nickel-chromium-molybdenum grades remain standbys. NE52100 given preference for certain applications. 3 ref.

23-216. **Analysis of Magnesium Applications in German Aircraft and Equipment.** F. A. Rappeleyea. *Aviation*, v. 44, Aug. '45, pp. 144-148.
Study of new uses of forgings, sand and die castings in BMW-801D and DB-601E engines, and Fungerrat radio reveals Nazis used alloys similar to ours; their techniques showed no superiority. 8 ref.

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23. INDUSTRIAL USES AND APPLICATIONS (*Cont.*)

23-217. **Automotive Bolts.** A. S. Jameson. *Iron Age,* v. 156, Aug. 30, '45, pp. 47-49.
Use of alloy steels for automotive bolts. The chief advantage of alloy steel for this purpose lies in its hardenability, since there appears to be no difference in the ductility factor.

23-218. **Low Melting Alloys as Production Aids.** Walter C. Smith. *Metals & Alloys,* v. 22, Aug. '45, pp. 397-402.
Characteristics of the ultra low melting bismuth alloys, and their applications for anchoring dies, tube bending, proof casting, electroforming, fixture work, precision casting and other processes.

23-219. **Light-Alloy Bicycles.** *Light Metals,* v. 8, Aug. '45, pp. 365-375.
Account of the development and present status of the aluminum bicycle.

23-220. **A Car for Better Days.** *Light Metals,* v. 8, Aug. '45, pp. 378-380.
Part to be played by light alloys in the car of the future.

23-221. **Aluminum and Magnesium in the Electrical Industries.** *Light Metals,* v. 8, Aug. '45, pp. 384-401.
Consideration of the theory and practice of the use of aluminum insulated by anodic treatment for electrical windings. 19 ref.

23-222. **Light Alloys in Rectifiers, Photocells and Condensers.** *Light Metals,* v. 8, Aug. '45, pp. 409-414.
Problems involved in condenser manufacture. Summarizes practical requirements for inter-leaving papers.

23-223. **Stainless Steel Offset Plates.** Clements Batcheller. *Modern Lithography,* v. 13, June '45, pp. 51, 53, 55.
Process used to produce essential grain surface.

23-224. **Aircraft Oil Tanks of Magnesium Alloy.** J. B. West. *Aluminum & Magnesium,* v. 1, Aug. '45, pp. 16-19, 34.
Description of the particular type of tank serves to bring out the point that design and fabrication of such tanks is no simple cut-and-dried procedure. Use of magnesium alloys for such structures requires attention to detail and the following of good design practice.

23-225. **Sapphires From Aluminum.** Joan Penney. *Aluminum & Magnesium,* v. 1, Aug. '45, pp. 25, 35.
Finely powdered alumina is dusted into an oxyhydrogen flame at intervals, and the fused mass settles down on a thin pillar set in the furnace. As it is fed to the flame, the fused alumina builds up a long "white" sapphire crystal, shaped like a bullet, which is called by the French word "boule". A "boule" takes about five hours to grow to a size weighing about 300 carats, and it then has to be allowed to cool before it is split for shaping.

23-226. **Controlling Variables in Gear Production.** *Steel Processing,* v. 31, Aug. '45, pp. 503-507.
To attain maximum efficiency, high accuracy and extreme refinement are characteristic of all phases of gear production. Factors are: Steel quality; influence of grain flow; the carburizing process; carburizing temperatures; type of compound; grade of steel; heat treatment; cementitic cases.

23-227. **Aluminum Tank Gives Record Service.** *Railway Age,* v. 119, Sept. 8, '45, pp. 404-405.
Car with 8000-gal. capacity tank completes 17 years of service up to August, 1945, making a total of about 408,000 miles with relatively small cost for repairs.

23-228. **Making Steel Cartridge Cases for the Navy.** William E. McFee. *Modern Machine Shop,* v. 18, Sept. '45, pp. 124-132, 134, 136, 138.
First tried as a substitute for brass for cartridge case material, steel has proved to be practical and advantageous.

23-229. **Magnetic Core Laminations Produced at Minimum Cost.** Guy M. Shingledecker. *American Machinist,* v. 89, Sept. 13, '45, pp. 113-115.
Good selection of steel, use of progressive dies of sectional type and a closely controlled annealing procedure are essential in fabricating magnetic core laminations on a sound basis.

23-230. **Producing 240-MM. Shell at Christy Park Works of National Tube Company.** *Industrial Heating,* v. 12, Sept. '45, pp. 1470-1472, 1474, 1476-1478, 1480, 1482, 1484, 1486, 1488, 1490, 1492, 1494, 1496, 1499, 1500, 1502.
Basic equipment used to produce the shell consists of two rotary-hearth furnaces for heating forging billets, a 1000-ton forging press, a hydraulically operated draw bench, heat treating furnaces, shell finishing lines, and other related facilities. Furnaces and processes described.

23-231. **Metallurgical Problems in Gas Turbines.** J. F. Cunningham, Jr. *Metal Progress,* v. 48, Sept. '45, pp. 484-488, 526.
Development of a gas turbine power plant for ship propulsion. Aim is to convert as much as possible of the energy in unburned liquid fuel into shaft horsepower.

23-232. **Burlington Vista-Dome Car.** *Railway Mechanical Engineer,* v. 119, Sept. '45, pp. 378-381.
Stainless steel car with glass-enclosed observation dome in the roof.

23-233. **Aircraft Engine Gears.** Forest R. McFarland. *SAE Journal,* v. 53, Sept. '45, pp. 511-520, 560.
Determination of causes of surface distress on existing reduction gears at the start of production and elimination of causes are described.

23-234. **Piston Rings in the War.** D. M. Smith. *SAE Journal,* v. 53, Sept. '45, pp. 521-530.
If a piston ring is to remain an effective seal over a long period of time, despite heat, pressure, corrosion, friction, and abrasion, it must be made from the proper material and it must be of the proper design.

23-235. **The Substitution of Blackplate for Tinplate in Cans for Fruit and Vegetables.** W. B. Adam and D. Dickinson. Iron and Steel Institute (Preprint), Aug. '45, 11 pp.
Effect of substituting lacquered blackplate ends for tinplate ends in fruit and vegetable cans. Points noted were rate of hydrogen formation in the cans, rate of dissolution of iron and tin, and the effect of the substitution on the color and flavor of the contents. The main conclusions were: Cold-reduced plate is superior to hot-rolled plate on blackplate ends covered with a single roller-coating of lacquer. Phosphating does not reduce the rate of internal corrosion and may increase it if the lacquer adheres indifferently to the surface of the plate. Types of lacquer vary in the protection they afford. Rates of attack of the various fruits and vegetables on blackplate ends differ greatly and are highest for the acid fruits and beetroot. Substitution of blackplate for the bodies of cans as well as the ends is impracticable for general use.

23-236. **Structural Engineering in Railway Work.** Institute of Structural Engineers *Journal,* v. 23, April '45, pp. 169-195. *Engineers' Digest* (American Edition), v. 2, Aug. '45, p. 412.
Describes a number of typical examples of structural steelwork carried out by the L.M.S. Railway during the past ten years. Principal works described in detail are the reconstruction of Leeds (Wellington) Station, the construction of transhipping shed at Derby and Birmingham, a locomotive testing station and a road motor workshop.

23-237. **The Final Touch.** *Die Casting,* v. 3, Sept. '45, pp. 26-28, 30, 45.
In Sunnen honing tools, die castings serve three primary purposes: As backing supports or blades; for the abrasive honing stones; as mandrels for carrying the holders; as replaceable guide and wear shoes for use with permanent type steel mandrels.

23-238. **From All Angles.** *Die Casting,* v. 3, Sept. '45, pp. 31-32, 34.
Wide angle binoculars have been designed for magnesium die castings with exceptionally good results especially in the attainment of thin wall sections.

23-239. **British Aluminum Permanent Mold Practice.** Jack W. Wheeler. *Modern Metals,* v. 1, Sept. '45, pp. 8-12.
Aluminum permanent mold castings were standard parts in many mobile engines in Britain prior to this last war. It is expected that due to a considerable reduction in the price of castings, they will be employed in many added applications in the new British automobiles. Tells of the close cooperation existing between foundry and consumer and also of some operations which have a direct bearing on low cost production.

23-240. **Magnesium in Portable Tools.** M. M. Moyle. *Modern Metals,* v. 1, Sept. '45, pp. 14-16.
Portable tools, used in most industries, must be both light and strong. Magnesium, no newcomer to this field, will unquestionably be used in increasing amounts in the days to come. Describes some magnesium applications which have proven themselves over a period of years, as well as some advantages to be gained through light weight tools.

23-241. **Aluminum Overhead Garage Doors.** *Modern Metals,* v. 1, Sept. '45, p. 17.
New and splendid application for aluminum. Aside from the light weight feature of aluminum for such a structure, the door's mechanism is installed in a small metal box which can be placed in an upper corner, out of the way. This allows for lower garage styling particularly where living quarters are planned over the garage.

23-242. **Cast Iron.** F. L. LaQue. *Iron and Steel,* v. 18, Aug. '45, pp. 375-378.
Corrosion data relating to plain and austenitic cast irons and applications of these and of high silicon irons are dealt with. (Gray Iron Founders' Society.) 21 ref.

23-243. **Precision Bolts and Studs.** *Automobile Engineer,* v. 35, Aug. '45, pp. 313-322.
Deals with many aspects of the manufacturing methods. Description given of the new pickling department. Cold-heading process on National Boltmaker machines is dealt with at some length, as are the special processes, swaging and centerless thread generation employed in the manufacture of Newallastic bolts and studs. Brief descriptions also given of the heat treatment equipment and equipment for manufacturing nuts. Methods of material and quality control are also discussed.

24. DESIGN

24-76. **Photo-Elasticity and Design Problems, Part I.** R. B. Heywood. *Aircraft Engineering,* v. 17, July '45, pp. 195-196.
Modern technique; determination of stress from the fringes.

24-77. **Some Applications of Metal Science to Design.** W. O. Richmond. *Western Miner,* v. 18, Sept. '45, pp. 46-48.
Deals with stresses, how they are described, how they are measured, and, in some degree, how they affect the material which is carrying them.

24-78. **Involute Gear Calculations Simplified.** Allan H. Candee. *American Machinist,* v. 89, Sept. 13, '45, pp. 122-128.
Tables of a factor k derived for changes in center distance and tooth thickness provide a short cut when designing and generating involute spur gears.

24-79. **Latitude in the Design of Spiral Gears.** W. A. Tuplin. *Machinery* (London), v. 67, July 26, '45, pp. 91-93.
Labor-saving method: examples.

24-80. **Screen Test.** Bernard J. Wolfe. *Die Casting,* v. 3, Sept. '45, pp. 20-21, 46, 48.
In designing projector, much thought was given to the ease and economy of assembly. With properly placed holes and cast ribs the only assembly tool required is a screw driver.

24-81. **Stoking up for Competitive Selling.** E. F. Biddle. *Die Casting,* v. 3, Sept. '45, pp. 22-24.
Advtanges of redesigning for die castings. With the use of die castings manufacturing costs were reduced and a more efficient product resulted.

24-82. **Die Castings Instrumental in Design Economies.** *Die Casting,* v. 3, Sept. '45, pp. 56-59.
Die cost is moderate, castings require a minimum of machine work because close dimensions, as cast, are held, sections can be comparatively thin, making for light weight, and the alloys available meet a considerable range of requirements.

24-83. **Projected Designs for Lightweight Automobiles.** W. C. Nichols and Joseph Palma. *Modern Metals,* v, 1, Sept. '45, pp. 4-7.
Thinking around automotive circles is definitely in the direction of decreasing weight. Public awareness; must redesign; automotive design; wider doors; grilles; bumpers; hoods; wheels; car interior.

24-84. **Formula for Design of Cam Clamps.** Alfred R. Goatley. *Tool Engineer,* v. 15, Sept. '45, p. 45.
Mathematics for determining a mean average, between angular extremes, essential to secure clamping.

24-85. **Designing Computing Mechanisms. Part II.** Macon Fry. *Machine Design,* v. 17, Sept. '45, pp. 113-120.
Mechanisms consist of certain basic elements which by themselves are readily understandable. Designers of other machines and control equipment will find new uses for such mechanisms; multiplying and dividing; offset follower; manufacture of gear gams; geometric computation of trig function; when resultant of components is needed; range of tangent and secant mechanism limited.

24-86. **Stress Distribution.** E. S. Clark. *Steel,* v. 117, Sept. 24, '45, pp. 116, 146.
Check list of current, accepted methods for determination of stresses which will prove helpful to those following the present tendency to limit by the more effective use of materials.

25. MISCELLANEOUS

25-96. **Steel-Handling Innovations.** G. W. Birdsall. *Steel,* v. 117, Aug. 27, '45, pp. 108-109, 132, 134, 137.
Increased capacity of Chicago steel warehouse; ideas that can be utilized effectively to cut cost of steel storage, handling and processing in almost any plant.

25-97. **Some Technical Developments of the War and Their Effects in Peace.** Ralph E. Flanders. Franklin Institute *Journal,* v. 240, Aug. '45, pp. 75-82.
Wonders of science and engineering. Some of the horrors of science and engineering. Developments are the hopefully useful byproducts of an enormous undertaking on the part of civilization to commit suicide.

25-98. **Production of Ammonium Sulphate from Coke Oven Gas.** Frans Wethly. *Blast Furnace & Steel Plant,* v. 33, Aug. '45, pp. 976-980.
Saturator operation; production by the low-differential controlled crystal size process; production costs; producing a product which will meet future demands.

25-99. **Versatile Stowage With Eight Way Pallets.** Templeton Smith. *Iron Age,* v. 156, Aug. 30, '45, pp. 34-36.
Methods developed by the Naval Ordnance Materials Handling Laboratory for maneuvering an eight-way pallet with a fork truck provide a variety of space-saving stowage patterns not possible with the customary two-way pallet.

25-100. **A Metallurgical Inventory.** H. W. Gillett. *Mining & Metallurgy,* v. 26, Sept. '45, pp. 419-423.
Some of the things that have happened in the last 15 years.

25-101. **Turbosupercharger Production Details.** S. H. Brams. *Iron Age,* v. 156, Sept. 6, '45, pp. 88-93.
Interesting welding, precision casting, and design innovations devised to master the difficult job of quantity production of precision turbosuperchargers, which in turn has greatly aided in the manufacture of gas turbines for jet aircraft.

25-102. **Planning Your Finishing Room Conveyor System.** E. S. Davidson. *Industrial Finishing,* v. 21, Aug. '45, pp. 70, 72, 74.
Why some conveyor systems retard full efficiency; heat drying, air-circulating equipment inadequate; why another factory's conveyor won't fit your production; more factors you must consider in conveyor design.

25-103. **The British Iron and Steel Industry.** *Metallurgia,* v. 32, July '45, pp. 115-120.
Manufactures of the iron and steel industry are essential in peace and in war, but the change from peace to war conditions was not a simple operation, especially when it became evident that the flow of production would develop into a spate. Wartime achievements and some of the difficulties which were overcome in supplying the necessary weight of armor and other important accessories.

25-104. **Labor Saving Devices Speed Production and Reduce Costs.** John T. Smith. *Production Engineering & Management,* v. 16, Sept. '45, pp. 71-72.
New methods for material handling and fabricating that possess broad applicability.

25-105. **Streamlined Production of Anchor Chain.** *Production Engineering & Management,* v. 16, Sept. '45, pp. 78-89.
Arduous physical tasks have been eliminated and production density greatly increased by employing mechanical handling systems in this modern industrial plant.

25-106. **Collection and Control of Magnesium Dust and Fumes: Part III.** O. E. Fenn. *Industrial Heating,* v. 12, Aug. '45, pp. 1371-1373.
Discusses precipitating fluids, practices recommended for protection of operators of grinding stands and polishing jacks.

25-107. **German Fastener Industry Thirty Years Behind Times.** *Steel,* v. 117, Sept. 17, '45, pp. 122-123, 176, 178, 180, 182, 184, 186, 188, 190.
Report of American investigators, C. F. Newpher of National Screw & Mfg. Co. and R. H. Smith of Lamson & Sessions Co., indicates Nazi policy detrimental to progress in machines and techniques. Plentiful supply of cheap labor encouraged laissez-faire attitude. A few plants very progressive.

25-108. **Collection and Control of Magnesium Dust and Fumes: Part IV.** O. E. Fenn. *Industrial Heating,* v. 12, Sept. '45, pp. 1553-1554, 1556, 1558, 1560-1562.
Portable-tool and flexible-shaft grinding, cleaning with metallic abrasives, core spraying, shake-outs and smoke tunnels, pouring stations and melting rooms are covered.

25-109. **On Engineering Writing.** Donald M. Crawford. *Mechanical Engineering,* v. 67, Sept. '45, pp. 607-609.
Notes recognizing some weaknesses that are commonly found in manuscripts prepared by engineers.

25-110. **A Method of Production Control.** George D. White. *American Foundryman,* v. 8, Sept. '45, pp. 45-47.
Production problems, aggravated by the unprecedented demands of the war years, have been met in many plants by control systems designed for particular plant conditions and accorded the cooperation of management and operating divisions. When service and costs again become vital factors in postwar production, control of the manufacturing process will be even more important than it is today.

25-111. **Eight Ways to Greater Handling Efficiency.** *Steel,* v. 117, Sept. 24, '45, pp. 148, 150, 172, 174.
New 8-way pallet used by U. S. Navy's Bureau of Ordnance provides important increases in versatility and flexibility in handling and stowage, at same time reducing aisle space requirements and strengthening unit loads.

26. STATISTICS

26-127. **Industry Estimates 1947 Markets.** *Iron Age,* v. 156, Aug. 23, '45, pp. 58-63
Composite view of postwar markets for manufactured goods by American manufacturers themselves looks for an excellent first postwar year for both business and employment. Certain ifs, ands and buts lead to less encouraging possibilities but the probabilities are such as to urge business expansion.

26-128. **The Outlook for Electrolytic Tin Plate.** K. W. Brighton. *Iron & Steel Engineer,* v. 22, Aug. '45, pp. 37-39.
At present, wide variation in the corrosion resistance of electrolytic tin plate precludes its use for processed cans without enameling. The future of the electrolytic plate in this field depends on consistent production of a highly resistant plate.

26-129. Tin—an American Problem. R. Martinez Vargas. *Metals*, v. 16, Aug. '45, pp. 6-9, 17.

Tin is totally missing from the great pool of natural resources contained within the borders of the United States. For tin, there are no direct substitutes; the ore or the refined metal must be imported if the great industrial potential of the United States is not to be completely disrupted. Current stocks limited; Bolivia ores vital; international accords.

26-130. Magnesium Poses Postwar Problems for United States Government and Industry. *Metals*, v. 16, Aug. '45, pp. 10-15.

Commercial use of metal will be far below wartime peak but new outlets being found; transportation and building offer vast opportunities for use of light metal alloys.

26-131. British Metal Trade Urges Higher Price on Copper —Believes Minimum Should be £70. L. H. Tarring. *Metals*, v. 16, Aug. '45, pp. 16-17.

Present level of £62 regarded as too low. Copper and zinc may be first two metals traded in on London 'change.

26-132. A Program for Silver. Perez Duarte. *Mining World*, v. 7, Aug. '45, pp. 36-38.

Suggestions and plans for the revival of silver.

26-133. Aluminum in Japan. *Metal Industry*, v. 67, Aug. 24, '45, pp. 121-123.

Deals with Japan's need of essential metals; gives an indication of the way in which she prepared for war and the problems which await those responsible for her deindustrialization.

26-134. Uranium Supply Will Be Difficult to Control. *Engineering & Mining Journal*, v. 145, Sept. '45, pp. 80-81.

Uranium is so widespread and abundant that we cannot depend on its scarcity to forestall the possibility of appalling destruction. It will be impossible to prevent a number of nations from obtaining it without our securing either their voluntary compliance or policing their internal activities.

26-135. The Steel Trade in War. Charles D. Rigg. *British Steelmaker*, v. 11, Sept. '45, pp. 388-390.

Great achievements under difficulties. Aluminum production in 1933 and 1938; Japan's resources; Mussolini's gamble; Britain's position; British empire steel ingot production; Axis steel ingot production.

26-136. British Steel. John A. Smeeton. *Iron and Steel*, v. 18, Aug. '45, pp. 373-374.

Post-war position of the industry.

26-137. Reich's Steel Potential Still Large, Despite Bombing Damage. George Reiss. *Steel*, v. 117, Sept. 24, '45, pp. 98-99, 201.

Half of capacity could be restored to production within three or four months. Only 30 to 35% needs complete rebuilding. Mills seldom were primary target of Allied planes. Transport system, supplying raw materials, badly wrecked.

27. NEW BOOKS

27-127. An Outline of Industrial Metallurgy. D. G. P. Paterson and J. Bearn. Chapman & Hall, Ltd., II, Henrietta Street, London, W. C. 12s. 6d.

27-128. Engineering Alloys. N. E. Woldman and R. J. Metzler. 2nd Edition. 833 pp., American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $10.00.

Trade names of 12,550 alloys; physical properties; chemical compositions; uses; names of manufacturers; indexed.

27-129. Catalytic Chemistry. Henry W. Lohse. 416 pp., illus., Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. $8.50.

A factual presentation of the underlying principles of catalytic phenomena and the application of catalytic reactions in industrial processes.

27-130. Experimental Stress Analysis; Proceedings of the Society for Experimental Stress Analysis; Volume 3, No. 1. Addison-Wesley Press, Inc., Kendall Square, Cambridge 42, Mass. $5.00.

Semi-annual publication of the Society for Experimental Stress Analysis, containing the papers delivered at the symposiums. (May, 1945.)

27-131. An Introduction to Magnesium and Its Alloys. John Allco. Ziff-Davis Publishing Co., 350 Fifth Ave., New York 1, N. Y. $5.00.

An over-all picture of magnesium, describing its historical background, mechanical development, physical metallurgy of magnesium and the known casting and fabricating processes, commercial treatments and finishing and joining procedures.

27-132. Collected Papers on Metallurgical Analysis by the Spectrograph. D. M. Smith. 162 pp., illus., British Non-Ferrous Metals Research Association, Euston St., N.W.1, London, England.

Thirteen papers on processing and calibration of the photographic plate, analysis of aluminum, lead, zinc, copper and platinum.

27-133. Machine Tool Guide; Engineering Data Covering the Machine Tools. Tom C. Plumridge and Others. 773 pp., illus., diag., American Technical Society, Chicago, Ill. $7.50.

Especially prepared for tool engineers, millwrights, and tool equipment salesmen.

27-134. A Bibliography on Cutting of Metals. Orlan W. Boston. 561 pp., American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y. $6.50.

4124 annotated references from 1864 to 1943 inclusive. Arranged alphabetically by authors and chronologically by years.

27-135. Electroplating—a Survey of Modern Practice. Samuel Field and A. Dudley Weill. 5th Edition. 483 pp., Pitman Publishing Corp., 2 West 45th St., New York, N. Y. $5.00.

Fundamental principles; electricity and electrochemistry; chemical analysis; sources of current; solutions; plants; cleaning; deposition of various metals; testing; coloring.

27-136. Strength of Materials; 4th Edition. Alfred P. Poorman. Illus., McGraw-Hill Book Co., 330 W. 42nd St., New York. $3.00.

27-137. Machine Drawing and Design, 4th Edition. W. Abbott. Blackie, London, 10s. net.

27-138. Science in Progress. Series 4. George A. Baitsell, 331 pp., Yale University Press, New Haven, Conn. $3.00.

27-139. Factory Organization and Management. N. F. T. Saunders. 163 pp., Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London, W.C.2, England. 10s. 6d. net.

27-140. Future of Industrial Research. 173 pp., Standard Oil Development Co., New York.

27-141. Research, Invention, and Patents. Andrey A. Potter. Industrial Research Institute, New York. Free.

27-142. Practice in Machining Zinc Alloy Die Castings. 68 pp., New Jersey Zinc Co., 60 Front St., New York. Free.

Addresses of Publications

(Continued from page 2)

Screw Machine Engineering, 45 Exchange St., Rochester 4, N. Y.
Sheet Metal Industries, 49 Wellington St., London, W.C.2, England (Wartime Address: 3 Amersham Rd., High Wycombe, Bucks, England)
Skilling's Mining Review, 501 Builders Exchange, Duluth 2, Minn.
Society of Automotive Engineers Journal, 29 W. 39th St., New York 18, N. Y.
Society of Chemical Industry (Journal and Transactions), 56 Victoria St., London, S.W.I, England
Stahl und Eisen, Dusseldorf, Germany
Steel, Penton Bldg., Cleveland 13, Ohio
Steel Processing, 108 Smithfield St., Pittsburgh 30, Pa.

Tin, 25 Charles St., Haymarket, London, S.W.1, England
Tin and Its Uses, Fraser Rd., Greenford, Middlesex, England
Tool and Die Journal, 2460 Fairmount Blvd., Cleveland 6, Ohio
Tool Engineer, 1666 Penobscot Bldg., Detroit 26, Mich.

Vancoram Review, 420 Lexington Ave., New York 17, N. Y.

Water Works and Sewerage, 330 South Wells St., Chicago, Ill.
Welder, Waltham Cross., Herts., England
Welding, Dorset House, Stamford St., London, S.E.1, England
Welding Engineer, 506 S. Wabash Ave., Chicago 5, Ill.
Welding Journal, 33 W. 39th St., New York 18, N. Y.
Welding Literature Review, 2 Buckingham Palace Gardens, London, S.W.1, England
West Scotland Iron and Steel Institute Journal, 93 Hope St., Glasgow, Scotland
Western Metals, 1709 W. 8th St., Los Angeles 14, Calif.
Western Miner, 505 Metropolitan Bldg., Vancouver, B. C.
Westinghouse Engineer, 306 4th Ave., P.O. Box 1017, Pittsburgh 30, Pa.
Wire & Wire Products, 300 Main Street, Stamford, Conn.
Wire Industry, 33 Furnival St., London, E.C.4, England

Zeitschrift fur Metallkunde, VDI Verlag, Berlin, N.W.7. Germany

A Complete Spring Service

Coil springs, wire forms, flat springs, brazing rings, of all materials, in any quantity and in special designs are now available at Paragon.

A complete service not only in the manufacture of springs up to 2½ in. diameter bar, but in engineering and consultation on spring design, is yours for the asking. A special department has been set up for small orders—so don't hesitate to call on Paragon, whatever your spring requirements.

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4615 WEST FULTON STREET, CHICAGO 44, ILLINOIS

Offices
Detroit Minneapolis Seattle

Mention R-270 When Writing or Using Reader Service.

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the ASM. Ads are limited to 50 words and only one insertion of any one ad will be printed. Address answers care of ASM, 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.

POSITIONS OPEN

CHIEF CHEMIST: Preferably some knowledge of metallurgy, for analytical lab of progressive malleable foundry in eastern Pa. Must be able to handle personnel and develop new methods. State exp. and salary. Box 10-5.

JUNIOR SALES ENGINEERS: To sell light alloy tubes, rods, shapes, strip, and plates. Good salary, advancement. Location northeastern states. Write for interview. Box 10-10.

SALES REPRESENTATIVES: Good opening for one or two men exp. in furnace business; erection, drafting, designing or selling. Permanent; location New England. We build oil, gas, and electric furnaces, both portable and field erected. Box 10-15.

TOOL STEEL REPRESENTATIVE: Distributor of complete line of tool steel, high speed cutting tools, drill rods and tool steel castings has opening for exp. tool steel engr. to cover Cleveland and Northern Ohio area. Box 10-20.

GRADUATE METALLURGISTS: For research at well-known technical college in east. Opportunity to study toward advanced degree. Salary adjusted to exp. and division of time between sponsored research and academic work. Box 10-25.

METALLURGIST: With gear heat treat exp. to supervise heat treat dept. and lab works. West coast. Box 10-30.

CHEMICAL ENGR.: Must have thorough knowledge of electrochem. for development and sales work on electro-deposition and plating. Some travel and liaison work with labs and plant. Must be energetic, cooperative and have sound tech. ability. Should have practical exp. in plating. Box 10-35.

EXPERIMENTAL MECHANICAL ENGR.: M.E. degree and familiarity with some or all of the following: Experimental stress determination; strain gages; theory and measurement of fluid flow through pipes and orifices; creep testing and application to design of parts for high temp. service; strength of matls.; basic metallurgy. Fine opportunity and a good wage. Write fully and in confidence to The Edward Valve & Mfg. Co., Inc., East Chicago, Ind.

POSITIONS WANTED

TECH. SALES EXECUTIVE: Broad exp. production and sales eng.; thorough knowledge of chem., met., gen. eng., elec., heat treat, welding, furn. and finance. B.S. Chem., M.S. Met. Harvard Graduate School, 1925. Registered Prof. Elec. Engr. Operated own heat treating plant for 3½ yrs. Midwest or Pacific coast. Box 10-40.

VETERAN: 18 months Ordnance, formerly met., tool and production man, sales engr. with cold finished steel producer. Age 36, interested in met. or sales eng. work, either domestic or foreign. Please mention salary and territory. Box 10-45.

METALLOGRAPHER: Also exp. routine chem. anal. and ferrous and non-ferrous phys. met. Would consider foreign assignment. Age 27, single woman. Box 10-50.

SPECTROGRAPHER: 4 yrs. exp. analyzing ferrous, non-ferrous matls. including furnace control. Exp. setting up lab and training personnel. Age 27; B.S. and advanced study in met. Desire charge of spectrographic or chem. and spectrographic lab. Excellent ref. Supervisory experience. Ohio or Chicago area preferred. Box 10-55.

GRADUATE METALLURGIST: Familiar various phases of fabrication, heat treat, metallography and quality control. Adaptable to inspection, research, contact work or production. Age 35. Box 10-60.

METALLURGIST: B.S. degree; 10 yrs. steel mill exp., specializing in metallography, phys. testing, heat treat, development, research, quality control, failure analysis, investigation of customer complaints and customer contact work. Responsible and conscientious. Box 10-65.

DIRECTOR OF TESTING & CONTROL LAB, including met., chem., spectrographic, phys. testing and machine shop. Grad. engr. Sound knowledge and exp. in quality control, metallurgy, electroplating, corrosion control, packaging, specification and operation sheet writing. Box 10-70.

RESEARCH METALLURGIST: B.S. Chem. Engr. 6 yrs. foundry and steel mill met. and chem. 7 yrs. aircraft lab; supervision, research, process control; welding, electroplating, finishes, corrosion, eng. tests, matls., chemistry. Interested in precision castings. Box 10-75.

PHYSICAL METALLURGIST: 28, M.S. 5½ yrs. training and exp. research and development in ferrous met. 1½ yrs. exp. in quality control and fabrication problems; capable tech. writer; learns quickly, adjusts readily to new environment. Box 10-80.

FOREMAN: 12 yrs. exp. large steel and wire mill, versed in most phases of heat treat, foundry and machine shop work. B.S. Mech. Eng.; age 38. Desires responsible position with good promotional possibilities. Box 10-85.

GRADUATE METALLURGIST: 14 yrs. exp. in open-hearth melting, rolling, forging, heat treat; ordnance materiel and tubular products. Comprehensive knowledge of phys. testing, metallography, trouble shooting, and gen. plant development work carbon and alloy steels. Box 10-90.

METALLURGIST: Broad exp. non-ferrous, rare and precious metals, induction heating, brazing, resistance welding. Familiar with metallographic techniques, radiography and phys. testing. Ferrous and non-ferrous precision casting. Age 30; M.S. in met. Box 10-95.

METALLURGIST: Age 31; M.S. degree. Wide exp. ferrous and non-ferrous met. Supervision of factory and research labs; phys. met., metal finishing, heat treat, castings, tool steels, and outside tech. contact work. Desires position as supt., chief, research, or plant metallurgist. Box 10-100.

HEAT TREAT FOREMAN: Or tool and die hardener. 2 yrs. univ. training in met. 8 yrs. exp. metallography and heat treat, including tool and die hardening. Box 10-105.

METALLURGIST-ENGINEER: Grad. Ch. E., age 35. Qualified dept. head. Diversified exp. met., lab practice, foundry, process and product development, machining, carbide tooling, inspection, heat treat, gen. eng. Desires metallurgist or production position that requires coordinating met., eng., and production. Box 10-110.

METALLURGICAL ENGINEER: Young, ambitious, 10 yrs. exp. research lab. Knows metallography, heat treat and fabrication techniques; has done special research on melting and alloying. Desires permanent supervisory position in small research or production control lab. Box 10-115.

POWDER METALLURGIST: Bach. Chem. Eng. and M.S. in Met.; major in powder met. Conducted fundamental and applied research at Stevens Inst. Handled all powder met. problems at Los Alamos Atomic Bomb Project. Detailed knowledge on equipment and most common and rare powders. Desire responsible position with large or small firm interested in powder met. Box 10-120.

METALLURGIST: B.S. Met. Eng.; age 28. 5 yrs. exp. ferrous met., trouble shooting in application and heat treat carbon, tool and stainless steels, machining; high speed, non-ferrous cast, and carbide tool development and testing; welding met. Single; willing to travel. Desires service or sales eng. or problem investigation in conjunction with sales service. East Coast or California. Box 10-125.

METALLURGICAL ENGINEER: Grad. 1940. Exp. ferrous met., plain and alloy steels, electric steelmaking, forging, heat treat, phys. testing, metallography, and some exp. sand and ferrous foundry control. Desires position as control metallurgist in steel plant. Age 28, married. Keen and energetic. Box 10-130.

SPECTROSCOPIST-CHEMIST: Age 33, 6 yrs. exp.; 3 yrs. chief spectroscopist, ferrous and non-ferrous forge shop and foundry. Former teacher, fully capable of supervising chem. and spectrochem. anal. Desires permanent position in chem. or spectrochem. work with good future. Box 10-135.

METALLURGICAL ENGINEER: 37, married, exp. heat treat, strip steel mills, machine shops, metallography, research and development in liquid and gas carburizing, cycle annealing, S-curves. Wishes to continue in research and development or contact work for aggressive manufacturing plant or steel mill, preferably Ohio. Salary $6000. Box 10-140.

CHEMICAL ENGINEER-METALLURGIST: 32, married, 10 yrs. in research, development, production. Cemented carbides, iron powder, secondary light metals, synthetic sapphire, diamond wheels. Box 10-145.

METALLURGIST-SALES ENGINEER: Age 36, married. 14 yrs. exp. non-ferrous, ferrous met. and metallography; foundry, all types of fabrication and heat treat. Capable of establishing and managing control and research lab. Location—N. Y. C. or vicinity. Box 10-150.

RESEARCH METALLURGIST: B. S. in Chem.; M.S. in Met. 4 yrs. exp. aircraft research and development lab; one year in supervisory capacity. Wide exp. ferrous and non-ferrous alloys; phys. testing, failure analyses, metallography. Exp. in metals applications, fabrication, heat treat, electroplating and processing. Trained in technical specifications and report writing. Box 10-155.

PHYSICAL METALLURGIST: Ph.D., minor in Chem. Eng. Fundamental training organic and inorganic chem. 3½ yrs. exp. section chief in Atomic Energy Project on metallurgy of uranium. 3 yrs. production exp. College teaching exp., patents, publications. Desires research and teaching or development and production. Sigma Xi, age 33, married. Box 10-160.

SUPERVISORY METALLURGIST or process engineer: 9 yrs. steel mill exp. including steel making, analysis, hot rolling, cold drawing, heat treat, resistance, atomic hydrogen, and pressure welding, pickling, mech. testing, inspection, metallography, and contact work. Box 10-165.

GRADUATE METALLURGIST: B.S.; age 27; married. Exp. practical and theoretical research and development problems of carbon steel products; testing; reports. Position desired pertaining to a pioneering or established tech. field in small aggressive firm. Box 10-170.

METALLURGICAL ENGR.: 14 yrs. exp.; tech. control and supervision, sheet and tinplate; development and writing spec.; presentation of tech. information in personnel training; consulting in metals and fabrication. Age 38, married. Desires tech. asst. to management or sales. Box 10-175.

HEAT TREATER: Age 36; 8 yrs. production heat treat; 2 yrs. tool hardening high speed tools. Cleveland preferred. Box 10-180.

FOUNDRY METALLURGIST: 14 yrs. exp. duplexing malleable iron. Capable of handling melting and sand control. Box 10-185.

METALLURGIST: B.S. Met. Eng. 1940, Sigma Xi. 3 yrs. exp. open-hearth and mill practice; trouble shooter, some supervisory work. 2 yrs. inspector naval matls. Desires met. contact or steel sales; or production engr. or plant supervisory position; Pacific northwest or Calif. Age 27, salary desired $4000 to $5000. Box 10-190.

RESEARCH ASSISTANT: In met. lab of large steel mfr. Several yrs. met. education at Temple Univ. 6 yrs. shop, 4 yrs. lab exp.; tests on tool steels, tool failures, heat treat; stainless and alloy steels; lab inspection. Box 10-195.

GRAD. METALLURGICAL ENGR.: Age 27, married. 3 yrs. exp. eastern steel plant and completion of supervisory training course. 3 yrs. as ordnance purchasing agt. for U. S. Army in Australia. Knowledge of non-ferrous met. Desires production engr. or met. control; location west, dry climate. Box 10-200.

SALES ENGR.: Ind. furn., temp. controls, gages and phys. testing machines. 19 yrs. exp. in two organizations, 12 yrs. in management. Ohio territory preferred. Box 10-205.

METALLURGIST: Specialized exp. in metallography, all types phys. testing, production and quality control and development work. College trained. Supervision training and exp. 12 yrs. steel and mill exp. plus 2 yrs. research. Age 33. Available 30 days after acceptance. Desires metallographist or production metallurgist. Box 10-210.

PRACTICAL METALLURGIST & CHEMIST: Grad. Engr. Desires opening in plant management, production, sales eng., or purchasing. Highly recommended. Ohio preferred. Box 10-220

MAGNAFLUX, HEAT TREAT & PLATING INSPECTION FOREMAN: 8 yrs. exp. magnaflux; 4 yrs. operator and inspector; 4 yrs. technician and foreman in aircraft production; 5 yrs. exp. as foreman of heat treat and plating inspection. Available immediately, anywhere. Box 10-225.

HEAT TREAT FOREMAN: 2 yrs. college, broad knowledge of heat treating, including all tool steels. Enough training for contact and sales work. Box 10-230.

SUPERVISOR of machine shop in large met. lab by journeyman machinist. Capable of taking charge of personnel, machinery and equipment, turning work out on production basis. Box 10-235.

METALLURGIST-FURNACE ENGINEER: Age 29, B.S. Met. Eng. 3 yrs. service with well-known furn. engr. Extensive exp. with combustion systems and furnace atmospheres (gas carburizing, nitriding, ferroxing, brazing, hardening, annealing, etc.). West Coast locality preferred but others considered. Box 10-240.

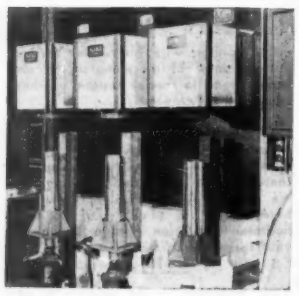
RESEARCH AND DEVELOPMENT POSITION: 3 yrs. responsible exp. in pilot plant metallurgy on electrolytic Cr, Mg, etc., equipment design, data anal. Proficient in math., foreign languages. Age 28; family. Now in Southwest, location immaterial. Box 10-245.

NEW PRODUCTS IN REVIEW

AUTOMATIC HEAT FOR FORGING

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.

Spotted right in the production line, these induction heaters of a new design speed the heating of bars or tubes for forging, upsetting or spinning—in seconds instead of hours.



To facilitate handling of the work, the Ajax-Northrup heaters are mounted vertically on a compact control cubicle.

The part to be heated, held in a fast-loading holding cup, is thrust up into the heating coil by a pneumatic ram. Power is applied, and is automatically cut off when the exact temperature is reached. The pneumatic ram then lowers the heated piece, which rolls to the forging machine on conveyors.

In the installation shown, at United Engineering & Foundry Co., three heaters are mounted on the control cubicle. Two of the heaters work while the third is being unloaded and reloaded. Speed is one piece per minute for each heater, with 250-kw. motor-generator power source. Controls are simple to operate, and automatically timed to the split second.

Each piece gets exactly the same treatment—top heat at the end, tapering off toward the unworked portion. On the press a few seconds later, the metal flows smoothly to form the correct shape. Practically any differential heating pattern can be achieved by proper coil design. Scale is negligible, resulting in longer die life and less die cleaning.

Simply by changing the heater taps and the time cycle, or by substituting relatively inexpensive heaters of different sizes, the same Ajax-Northrup equipment can quickly be converted to many different heating operations.

Mention R-271 When Writing or Using Reader Service.

MAGNETIC STRAIGHT EDGES

The B & W Company,
7610 So. Figueroa St., Los Angeles 13, Calif.

Flame-cutting vertical and overhead, as well as horizontal surfaces, is said to be greatly facilitated by the new B & W magnetic straight edges.

An 18-lb. pull holds the B & W magnetic straight edge firmly to the work whether the plate is rusted, oily or painted. The Alnico magnets, which are not affected by electricity, are said to last for years.

Uniformly clean and accurate cuts are assured because the torch tip is held at the correct distance from the work. The straight edges are easily adjustable to any bevel angle. Bevels are cut in one operation.

Made of specially heat treated aluminum alloy, rigid as well as light in weight, B & W magnetic straight edges will not warp from heat and are resistant to corrosion.

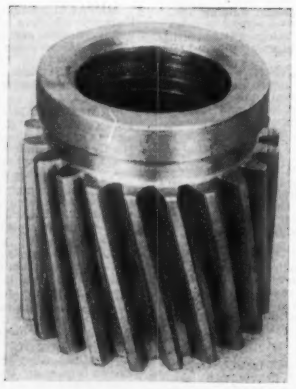
Three models are offered in lengths from 18 to 36 in.

Mention R-272 When Writing or Using Reader Service.

NEW HIGH TENSILE STEEL

Horace T. Potts Co.,
East Erie Ave. and D. St., Philadelphia, Pa.

A new high tensile machinery steel, Elastuf Type A-2, is delivered in the heat treated condition, with guaranteed tensile strength of 125,000 psi. or better. It is readily machinable, reliably uniform, and has remarkable uniformity in cross-sectional hardness. It has been used for crankshafts, gears, shafts and miscellaneous machine parts, with excellent performance.



A typical example of the value of this new steel is in the gear pictured. For the service expected, this gear would have had to be machined, then heat treated and ground to eliminate distortion. Made of Elastuf Type A-2, it was machined to exact specifications and applied immediately. No matter where the wear or stresses occur on the teeth, the user is assured of the proper hardness and strength.

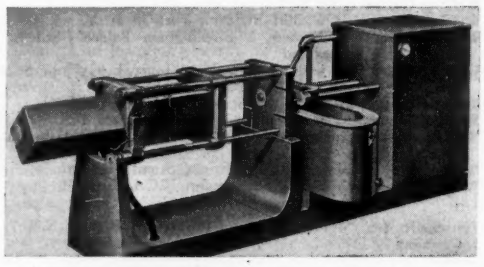
Mention R-273 When Writing or Using Reader Service.

AUTOMATIC DIE CASTING

H. L. Harvill Manufacturing Co.,
P. O. Box 335P, Vernon, Calif.

An entirely new line of die casting machines has been developed by H. L. Harvill, leading West Coast pioneer of the die casting process. Four basic machines are included in the line with various sizes available in each. The second of these four machines to be announced is the HDA Series of automatic air operated machines for casting zinc, tin and lead alloys. The HDA Series machines depart from the conventional "gooseneck" injection method commonly used for casting these non-ferrous, low melting point alloys.

In contrast to a "gooseneck", which is submerged in a pot of molten metal, the Harvill machine embodies a metal feeding device which feeds a continuous stream of the molten alloy into a horizontal injection chamber. Injection



of the metal into the die cavity is accomplished by an air operated ram developing as much as 1410 psi. pressure on the metal in the die cavity during the period of metal solidification. Because of this higher pressure, a finer degree of surface finish and a closer maintenance of dimensional tolerances is accomplished due to the intimate contact of the metal with the die face and the effect of packing the metal into the die while it is in a semi-molten condition. The horizontal ram method employed is more consistent as to pressure exerted on the metal, therefore producing castings of greater uniformity.

The sizes available will accommodate a die ranging from a horizontal dimension of 12 to 24 in. with a vertical dimension of 8 in. for the smallest size. Die thickness may vary from 14 in. in the smallest size to 22 in. in the large machine with a die opening between the die faces of 6¼ in. in the small machine and 12 in. in the large machine. HD-2A1 will cast 6.1 lb. of zinc base alloy, the HD-3A1 will handle 12.7 lb., and the large HD-4A1 is capable of casting 21.2 lb. All three sizes will cast this amount under normal conditions at a rate of 400 shots per hour, requiring from 1.85 cu. ft. to 9 cu. ft. of air at 150 psi. to maintain this production rate.

All of the new Harvill die casting machines are intended for use on a production line and are part of the "complete package plan" offered by the H. L. Harvill Mfg. Co.

Mention R-274 When Writing or Using Reader Service.

TWO HARD-FACING ALLOYS

Stoody Co., Whittier, Calif.

Life of wearing equipment which is affected by heat, corrosion, impact or abrasion, has been increased three to ten times by the use of Stoody non-ferrous, hard facing alloys for oxy-acetylene application. In numerous applications, however, wear resisting parts cannot be satisfactorily hard faced with oxy-acetylene equipment.

For these applications Stoody Co. now offers two new hard facing alloys for electric application—Coated Stoody 1 and Coated Stoody 6. A special dipped coating makes application easy with either a.c. or d.c. electric equipment, and at the same time protects the alloying elements so that weld deposits are produced having the same analysis and physical properties as those applied by the oxy-acetylene torch.

To retain the greatest degree of hardness, heat resistance and corrosion resistance, iron pick-up should be minimized during application. This is most effectively accomplished using straight polarity on d.c. electric applications.

Similar characteristics result with a.c. application. Rapid burn-off rate with low penetration and high build-up are normal operating characteristics of both coated electrodes.

Porosity and shrinkage cracks are almost completely absent in Coated Stoody 6 deposits, and their presence is further minimized by slow, even cooling. Because elongation of Coated Stoody 1 is nil, some shrinkage cracks may occur in deposits applied electrically. In most cases, however, such cracks do not affect the efficiency of the hard facing deposit. Both Coated Stoody 1 and Coated Stoody 6 provide good slag coverage and slag is easily removed after welding.

Recommended uses are for all heavy equipment subjected to heat, abrasion, corrosion and impact, and for hard facing intricate parts where use of oxy-acetylene is impractical. Coated Stoody 1 is generally applied where sliding abrasion is of major importance because of its high hardness and wear resistance. Coated Stoody 6, having greater ductility, is preferable for those applications involving impact. Typical applications are as follows: Heavy hot punches, heavy blades for cutting scrap or shearing hot steel, blast furnace bleeder valves, blowing engine gas valves and seats, heavy mill guides, hot trimming dies, blanking dies, forming dies, stoker screws, coke oven push shoes.

Mention R-275 When Writing or Using Reader Service.

INDUSTRIAL OVEN

Despatch Oven Co., Minneapolis, Minn.

New, mass produced RS industrial ovens, in sizes from 2x2x3 ft. to 4½x6x9 ft., are adaptable for all baking and drying processes up to 500° F. and speed baking by as much as 50%. Units are self-contained and require only lead-in of gas or electricity for complete installation.

A special loading dolly and shelf arrangement permits easy loading and maximum use. Upright position also means easier loading plus floor space saving. Automatic controls and quick starting make oven readily adaptable from one type of operation to another.

These ovens are now successfully in use on radio and radar; coil and armature drying and baking; carbon brittlement and aluminum aging; baking a variety of synthetic finishes, Japans, varnishes, lacquers, enamels, and all kinds of dehydrating and drying.

Special safety features and complete insulation insure comfort and health of workmen. Uniform temperature, high volume air flow, and controlled volatile exhaust assure quality and uniformity of processing, as well as reduction in baking time.

Mention R-276 When Writing or Using Reader Service.

HIGH PRESSURE PUMP

Precision Scientific Co.,
1754 N. Springfield Ave., Chicago 47, Ill.

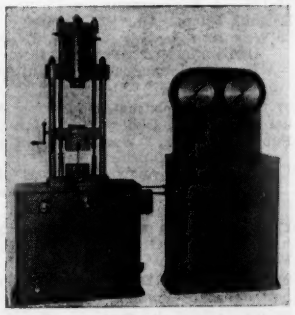
Developed in collaboration with the Universal Oil Products Co., the "Precision" U.O.P. duplex high pressure pump, variable stroke, meets the requirements for a sturdy, continuous-duty, high-pressure, adjustable stroke pump for use in pilot plant operations, experimental pressure work, and for many industrial applications. The pump is of the duplex type, with individual cylinders permitting two different types of liquids to be pumped simultaneously, or, where increased volume is desired above the capacity of a single cylinder, both cylinders can be piped in parallel. Because of the compact design, these pumps are particularly adaptable to most applications where space is at a premium. The design of the duplex pump permits continuous operation and will maintain a given flow rate continuously, delivering full rated output at maximum rated pressure. Volumetric efficiency throughout the full range is over 90%.

Mention R-277 When Writing or Using Reader Service.

UNIVERSAL TESTING MACHINE

Steel City Testing Laboratory,
8843 Livernois Ave., Detroit 4, Mich.

This machine, designed for making tensile, transverse and compression tests up to 60,000 lb., is hydraulically operated. The piston and cylinder are a lapped finish, carefully fitted without any packing, allowing for a minimum of friction. The pulling head unit thrust is taken on a large steel ball and socket which allows the head to float. The upper and lower pulling heads are of the conventional type with wedge-type jaws for both flat and round specimens. Holders are also available for shoulder and thread end specimens.



A suitable load regulating valve is provided which will maintain a uniform load rating. Any load can be held for any period at the will of the operator. The gages are provided with maximum pointers and both gages are fully protected against overload. A gage selector valve is provided. A maximum stroke of 6 in. is provided in the cylinder. The traverse table has a maximum span of 30 in.

Mention R-278 When Writing or Using Reader Service.

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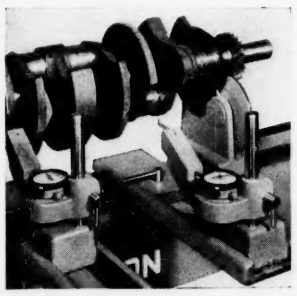
NEW PRODUCTS IN REVIEW

ROTO-CHECKER

Anderson Bros. Mfg. Co., Rockford, Ill.



For speeding up the operation of checking crankshaft bearings, this company has developed a special Roto-Checker. The crankshaft is placed on four rotating disks and a number of indicators are brought into position and the crankshaft is revolved.

One indicator can be furnished for each bearing. The four disks roll on accurate and super-sensitive ball bearings. The bases are made in two lengths—42 in. and 64 in. Larger Roto-Checkers can be made to suit customers' special work.

Mention R-279 When Writing or Using Reader Service.

MASTER COILS

Induction Heating Corp.,
389 Lafayette St., New York, N. Y.

A master coil with removable inserts practically eliminates the problems of coil changing in setting up Thermonic equipment for various induction heating applications.

The inserts can be changed in a matter of seconds and are now available in complete sets which will accommodate diameters ranging from ⅛ to 3 in. in small increments.

The basic master coil consists of a rugged, water-cooled inductor block, machined to take inserts which go to make up the actual coil. Used with a Thermonic output transformer, this new development gives, in effect, a single-turn inductor block of variable inside diameters. The inserts can be of any desired thickness, thus making the coils capable of heating axial bands of various widths to produce the many heat patterns possible with induction heating.

The insert is held in place by easily-removable screws, and when installed, obtains its cooling by thermal conduction from the master coil. The inserts may be used in multiples, thus offering the flexibility of many different coils of unusual contour.

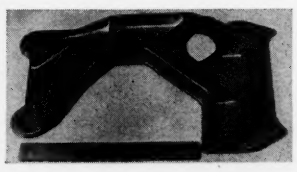
The standard Thermonic master coil set consists of two master coils and 48 inserts contained in a specially constructed wood chest which permits the coils and inserts to be kept in ready access. The smaller master coil, with 27 inserts, accommodates round stock ranging from ⅛ to 1¼ in. and these inserts are of three thicknesses for each diameter: ⅛, ¼ and ½ in. The larger master coil, with 21 inserts, takes stock ranging from 1½ to 3 in. and the inserts are in the same three thicknesses as for the smaller coil. Blank inserts are available to allow the user to cut the desired contour to match the particular work, and the Induction Heating Corp. will furnish special inserts on order.

Mention R-280 When Writing or Using Reader Service.

ALUMINUM FORGING

Reynolds Metals Co., Louisville, Ky.

Pictured here is an aircraft part forged from R303, the new Reynolds strong aluminum alloy. It is the largest forging yet to be made from an aluminum alloy of such high strength. Use of strong aluminum alloys as forging stock heretofore has been considered impractical.



The usual specified tensile strength for aluminum commonly used in forging aircraft parts is 65,000 psi. R303 provides a tensile strength as high as 85,000 psi., a strength increase of approximately 30%.

Use of R303 alloy in such forged parts allows for a reduction in the size of the part in proportion to the increase in strength. There is also a reduction in weight, an all-important factor in aircraft construction.

The part illustrated was forged on a 12,000-lb. hammer from 3¼-in. round stock.

Mention R-281 When Writing or Using Reader Service.

NEW ELECTRODE FOR CAST IRON

Harnischfeger Corp., Welding Div.,
Milwaukee 14, Wis.

Harcast, an all-position mild steel electrode for welding and repairing cast iron, is entirely new and completely different in its operating characteristics. It fuses well with either mild or medium carbon steel, thus making it ideally suited for joining cast iron with other types of steel. With a yield point of 50,000 psi., the deposited metal has an ultimate tensile strength of 60,000 psi., roughly double that of a good grade of cast iron.

Usable with either a.c. or d.c. machines (straight or reverse polarity on d.c.), "Harcast" works well at low amperage, thus minimizing the dilution effect at the fusion zone and permitting a higher quality of machining. Reverse polarity on d.c. current produces a smooth bead with deep penetration. On d.c. straight polarity, penetration is less, higher beads are built, and there is less spread in the fusion zone. In either case—as with a.c. current—"Harcast" assures a sound, deep weld for any good grade of cast iron.

Mention R-282 When Writing or Using Reader Service.

PICKLING INHIBITOR

Kelite Products, Inc., Los Angeles, Calif.

A controlled pickling inhibitor protects metal and saves acid by causing the pickling acid to work on the scale only. It prevents attack on healthy metal and reduces the possibility of hydrogen embrittlement.

The new inhibitor, trademarked as "Kelite Control", is a reddish brown liquid soluble in either sulphuric or muriatic acid. It is packaged in 5-gal. cans and 15 and 55-gal. drums.

Mention R-283 When Writing or Using Reader Service.

LABORATORY HOT PLATE

Lindberg Engineering Co.,
2450 W. Hubbard St., Chicago 12, Ill.

The Lindberg line of laboratory hot plates with working temperatures from 110 to 950° F., for such varied and routine laboratory jobs as boiling, evaporations, heating, etc., has been redesigned to give even more efficient service.

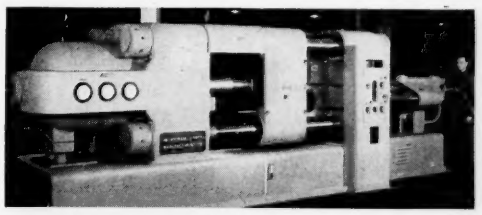
Improvements include mounting the electrical input control on the front of the hot plate. This control permits the manual selection of any degree of heat within the temperature range of the hot plate. It is this principle of input control, according to the company's statement, that has been so successfully used for many years on industrial furnaces. These hot plates, in three sizes: 10x12, 12x20 and 12x30 in., are fitted with top plates made of extra heavy special metal that resists growth, warpage and corrosion and minimizes discoloration caused by spillage.

The Lindberg hot plates are equipped with coiled nickel-chromium elements and refractory type element holders enclosed on all sides and bottom by an especially heavy layer of insulation. This assembly is protected by a heavy sheet metal housing providing a deep chamber beneath the element insulation for the internal wiring and terminal boards for making power line connections.

Mention R-284 When Writing or Using Reader Service.

LARGEST DIE CASTING MACHINE

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio



One of the world's largest high pressure die casting machines, this massive "all-hydraulic" machine is designed to cast 14.88 lb. of aluminum alloy per "shot" at an injection pressure of 25,000 psi. This weight represents a casting volume of 154½ cu. in.

A majority of high pressure aluminum die castings are produced with injection pressures ranging from 10,000 to 12,000 psi. If such pressures prove satisfactory for extremely large parts, it is quite possible that aluminum castings weighing 30 lb. or more can be produced with this revolutionary H-P-M die casting machine.

All of the advantages of high pressure die casting can now be obtained in large light metal parts. Principally these advantages are the ability to produce interchangeable, high quality parts at a very high hourly rate, and to shape them so precisely as to reduce finishing operations to an absolute minimum.

The machine is of the same basic design as H-P-M's standard model 400-A die casting machine, only larger in size. Both mold clamp and injection plunger are actuated by direct hydraulic means. The machine is powered by two H-P-M hydro-power radial pumps, directly connected through flexible couplings to a 100-hp., double-end-shaft motor. The only connections required to put the machine in operation are electric power and cooling water. Movable mold clamp platen is equipped with hydraulic ejector. System is designed for installation of hydraulic core pulls.

Mention R-285 When Writing or Using Reader Service.

READER SERVICE COUPON

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The Metals Review, October 1945

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MANUFACTURERS' CATALOGS IN REVIEW

Centrifugal Castings

American Cast Iron Pipe Co., Birmingham 2, Ala.

"Acipco Steel—Centrifugally Cast" is the title of a new catalog describing several new materials developed during the war and now available on an industry-wide basis. Included are centrifugally cast steel tubes and parts in plain carbon, medium alloy, and high alloy heat and corrosion resistant steel; heat and corrosion resistant bolts in high strength cast iron, malleableized Ni-resist, 18-8 stainless and 25-20 chromium-nickel steel; centrifugally cast cylinder liners in alloy cast iron, plain cast iron, plain carbon and alloy steel.

Heat and corrosion resistant high alloy centrifugally cast tubes will be used extensively for oil refinery still tubes, radiant furnace tubes, rollers, etc.; low and medium alloy for oil refinery vapor lines, high temperature steam lines, etc. Corrosion and heat resisting bolts will be used for connecting underground piping systems, submarine pipe lines and general purpose structural use where heat or corrosion resistance is required. Centrifugally cast cylinder liners are designed for diesel oil engines, truck and bus engines, automotive engines, pump liners.

Mention R-286 When Writing or Using Reader Service.

Quality Control Primer

Federal Products Corp.,
1144 Eddy St., Providence 1, R. I.

This 24-page "Dimensional Quality Control Primer" is a practical approach to a subject frequently surrounded by a great deal of theory and associated ramifications which are confusing to the uninitiated. With such control, instead of inspecting the work-piece for dimensional accuracy after it is completely made, dimensions are inspected by means of indicating gages as the work-piece is made at the machine. It then records its findings and by applying simple mathematics and the law of probability it obtains data which improve quality at the machine, reduce wasted machine and manhours, and material; also, it determines what disposal should be made of the product and what change is needed in the specifications or in the production.

Work and chart sample sheets are enclosed in each primer and these are the only standardized sheets of this kind available for the trade at this time. Every plant has to either print its own or buy coordinate paper for adjustment to its needs. However, both sheets are available from Federal, the chart sheets costing $6.00 per thousand and the work sheets, $2.50 per thousand. However, there is no charge for the primer itself and this may be secured with the Reader Service Coupon.

Mention R-287 When Writing or Using Reader Service.

Rolled Shapes

Lukens Steel Co., 272 Lukens Bldg., Coatesville, Pa.

Special rolled shapes available at Lukenweld, Inc., division of Lukens Steel Co., are illustrated in a bulletin which has just been published. The bulletin pictures the facilities of Lukenweld's roughing mill, together with examples of special rolled steel shapes which were produced on it; also a number of Lukenweld fabrications utilizing special rolled shapes.

Mention R-288 When Writing or Using Reader Service.

Spectrograph

Harry W. Dietert Co., 9330 Roselawn, Detroit 4, Mich.

New two-meter grating spectrograph is described in this four-page folder. This new instrument can be supplied with 36,600 lines per in. or 91,500 total grating lines, representing an unusually fine ruling. This has made possible the production of a high dispersion unit without resorting to a bulky, long focal length. A 24-in. camera provides a 20-in. spectrogram on 35-mm. spectrum film. Camera is movable on a radius arm which means that the operator can effect positioning along the Rowland circle so that any 20-in. portion of the total 60-in. spectrum may be photographed at one time.

Mention R-289 When Writing or Using Reader Service.

Non-Magnetic Applications of Manganese Steel

American Manganese Steel Div.,
American Brake Shoe Co., Chicago Heights, Ill.

Austenitic manganese steel has high resistance to impacts, heavy stresses and abrasion and an increasing field is taking advantage of its freedom from magnetism. Typical applications of a non-magnetic type are described in this 32-page booklet. Included are an interesting series of questions and answers on manganese steel and a description of production and research facilities at Amsco.

Mention R-290 When Writing or Using Reader Service.

Aluminum Treating Process

Enthone Co., Dept. MTR,
442 Elm St., New Haven, Conn.

The "Alumox" process for chemically treating aluminum and aluminum alloys produces a corrosion inhibiting coating that serves to protect the aluminum against corrosive atmospheres such as salt spray and also presents an excellent base for organic finishes. The process is stated to be particularly suitable for aluminum alloys containing no copper. On such alloys, coatings can be obtained with salt spray resistance of 250 or more hours.

The process requires no electric current and consists in immersing the aluminum in a dilute solution of "Alumox" salts operated near 210° F. from 2 to 15 min. The finish obtained is grayish-green which is an attractive finish in itself. Further details are given in a four-page illustrated leaflet.

Mention R-291 When Writing or Using Reader Service.

Forgings

Wyman-Gordon Co., Worcester, Mass.

Attractive 64-page book is a pictorial trip through a great forge plant. Equipment is shown and many types of dies illustrated. Scenes in forge shop, heat treat department and metallurgical laboratory are included.

Mention R-292 When Writing or Using Reader Service.

Specialized Metal Finishes

Technic, Inc., 39 Snow St., Providence 3, R. I.

Metal finishes and processes developed by this company are shown in this four-page leaflet. Featured is Protectox, an invisible oxide wrapping the surface of copper, brass, silver and gold in a complete coverage. This process seals the surface and is recommended where organic coatings are not permissible. It provides an excellent base for paints, enamels or lacquers, increasing adherence 300%, based on crash tests.

Mention R-293 When Writing or Using Reader Service.

Forged Gaskets

Steel Improvement and Forge Co.,
970 E. 64th St., Cleveland, Ohio.

"Gruv-Seal Forged Iron and Alloy, Ring Gaskets" is the title of this eight-page booklet giving complete information and buying data on forged gaskets made of ingot iron, nickel, chromium and monel metal. The gaskets are particularly suitable for high pressure and high temperature service, and various applications and advantages of these gaskets are presented for different service requirements. Forging methods used to make these gaskets are also presented. Four tables give A.P.I. and A.S.A. ring gasket sizes and special stock sizes, as well as list prices.

Mention R-294 When Writing or Using Reader Service.

Stainless Strip Steels

Superior Steel Corp., Carnegie, Pa.

Colorful new brochure containing valuable information and technical data on stainless strip steels has just been issued to describe properties, compositions and applications of various types and grades of stainless steel. Illustrated throughout, the booklet is sufficiently detailed to be of value to designers and fabricators.

In addition to technical tables on each type of stainless strip, the brochure includes tables on physical and mechanical properties of certain metals and their alloys and a table on weights of steel strip. Corrosion resistance of the austenitic, martensitic and ferritic types of stainless steel is also shown, with a comprehensive list of the various chemicals and solvents which each type resists. Outlined too is the story of more than a half-century's specialization in the manufacture of fine strip steels and the concentration on research and production.

Mention R-295 When Writing or Using Reader Service.

Furnace Catalog

C. I. Hayes, Inc., 75 Baker St., Providence 5, R. I.

A new "40th Anniversary Catalog No. 108" of "Certain Curtain" controlled atmosphere electric heat treating furnaces describes furnaces for hardening high speed steel and carbon, alloy and stainless steel tools and dies; annealing; copper brazing; tungsten carbide tool tip brazing; sintering metal powders; conveyor hardening, annealing and brazing; vertical heat heating; tempering; melting; also auxiliary atmosphere generating and recirculating equipment. Included is a section devoted to furnace atmosphere control, containing recommended atmospheres for a wide variety of standard brands of steel, together with manometer tables for obtaining desired atmospheres with various types of gas.

Mention R-296 When Writing or Using Reader Service.

Overlay Electrodes

Sight Feed Generator Co., Richmond, Ind.

Six types of "Rexaloy" overlay electrodes with examples of how and where they may best be used are presented in this four-page folder. These electrodes are said to be unique in their field, having a coating composed of chromium, nickel, copper, vanadium, manganese and other metals, the amounts varying with the type of rod. These blend with the core rod during the welding, forming a dense, slag-free alloy overlay. This principle replaces many desirable elements which are lost, in most electrodes, while passing through the arc. The folder discusses the problems often encountered in the replacement of worn-away metal.

Mention R-297 When Writing or Using Reader Service.

Surface Treatment

Turco Products, Inc.,
P. O. Box 2649 Terminal Annex, Los Angeles 54, Calif.

A 60-page book lavishly illustrated with photographs, engineering drawings, charts and diagrams, gives complete technical information on the advantages and uses, the method of installation and control, of three surface treatment processes: Anodizing, chromatizing and phosphatizing. Complete engineering details are covered.

Another ten-page booklet digests the basic chemistry and engineering involved in zinc plating. The merits of electrolytic versus still hot tank cleaning are discussed, pickling procedures, the composition and control of the plating baths, and the uses of the chromic acid dip.

Mention R-298 When Writing or Using Reader Service.

Aluminum Bronze Gears

Ampco Metal, Inc.,
1745 S. 38th St., Milwaukee 4, Wis.

"Ampco Metal in Gears" is a four-page bulletin describing the use of this aluminum bronze in gear applications. The bulletin emphasizes the superiority of this alloy over ordinary gear bronze and contains a table showing preferred grades of Ampco metal for various types of gear service.

The bulletin points out that common causes of gear trouble are breakage, deformation, wear or flaking and pitting of the teeth, whereas Ampco metal's high tensile strength, yield strength and elongation aid in eliminating breakage encountered in weaker bronzes.

Mention R-299 When Writing or Using Reader Service.

Fabricated Alloy Containers

Stanwood Corp., 4819 W. Cortland St., Chicago 39, Ill.

Bulletin 15 describes a comprehensive line of fabricated alloy containers and work holders for handling parts through heat treating, quenching, pickling, degreasing, rust-proofing baths and similar operations. This 12-page bulletin is profusely illustrated; the units pictured include baskets, crates, trays and fixtures, carburizing boxes, and special equipment designed by Stanwood engineers for unusual requirements. The company's line of fabricated carburizing boxes and retorts is also shown. Many new and unique designs are depicted.

Mention R-300 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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